Universities Quarterly

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University Commentary

A Royal Commission on the Universities?

CHARLES WILSON KENNETH URWIN

D. A. BELL WILLIAM WALSH

University Standards

R. R. DALE

New Hope for Adult Education

F. MUSGROVE

The German Universities Today

G. R. POTTER

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ANONYMOUS

American Education and the British Commonwealth

C. W. DE KIEWIET

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On Wordsworth's 'Michael'

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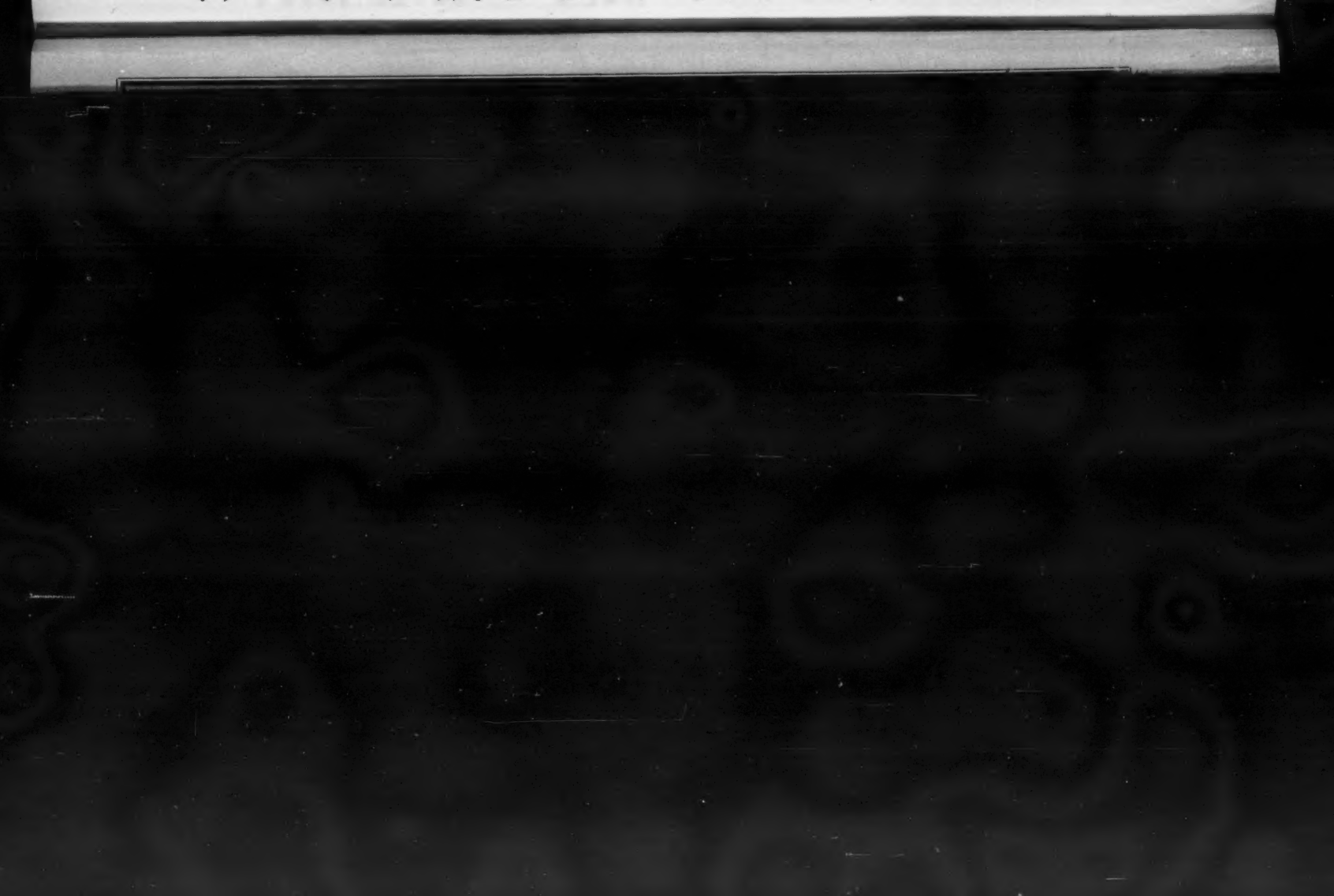

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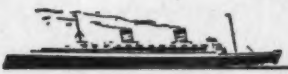

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Universities Quarterly

UNIVERSITY COMMENTARY

A ROYAL COMMISSION ON THE UNIVERSITIES?

I. CHARLES WILSON

Vice-Chancellor, the University of Leicester

LORD SIMON'S article under the above title in the last issue of *Universities Quarterly* is a plea for a full-scale enquiry into the British Universities. The basis of the plea is not that Lord Simon thinks there is something radically wrong. Far from it—he would appear to hold the view that 'the prestige of the universities has never been higher than it is today'. Nor does he think the system by which the universities receive grants from the Government through the University Grants Committee has failed to function adequately. On the contrary, he says it has done 'an outstandingly good job' of 'the greatest importance and value to the country'. What then is the case for a Royal Commission?

The case is not very clearly put. Lord Simon's article lists almost all the questions about our universities which could reasonably interest the most persevering inquirer. He has questions on the government of universities, their finance, their administration, their size, their student composition, their staff, their buildings, their degrees and courses, their relations to each other, their methods of teaching and their methods of selection. There are so many heads and sub-heads that the author is deceived into thinking that there is nothing for it but to have a Royal Commission 'on the whole university system'. This is a fate I hope we may be spared. Such vague and far-reaching terms of reference are surely to be avoided. The experience of past commissions of inquiry sufficiently attests that 'a roving commission is a roving nuisance'.[1] Such a commission takes endless time and causes endless trouble and seldom provides in the end a document of practical service. The career of such roving Royal Commissions has perhaps been the chief evidence to support the view that the appoint-

ment of such bodies is the standard method of postponing indefinitely decisions on matters which are embarrassing rather than urgent.

Something of this objection Lord Simon perhaps concedes when he turns from the desire for 'a thorough and independent study of the whole university system' to the admission that 'a Royal Commission could not find time to examine more than very few of the large number of questions that would repay investigation'. What would he select? At this point, the end of the paper, Lord Simon gives up the shadow-boxing and lets us see what he is really after. What he is after is more, and more efficient, national planning of the universities. He really doubts whether the present system, by which the U.G.C. advises the Chancellor of the Exchequer on the problems and needs of the universities and in turn mediates to them the views of the Government, adequately disengages the nation's requirements in respect of the universities. He wonders whether there is enough planning and whether fundamental and long-term questions are not apt to be neglected.

Well, long-term questions are always apt to be neglected. Under any form of organization this is so and to bring the universities more fully under some special Minister will not ensure attention to them. The best hope for their being remembered is in the universities themselves. Lord Simon is altogether inadequately informed on the vast amount of discussion that goes on in the university world. For example, this year, like many other university men I have discussed a great many of the long-term topics Lord Simon has raised on what might be thought to be almost an undue number of occasions. These discussions have been conducted in London (at the Home Universities' Conference), at Leicester (where the A.U.T. gave its approval to a lengthy study of fundamental topics), in Toronto and Montreal (at the Commonwealth Universities' Conference) and in a score of other great university centres in Canada and the United States. Next year we shall discuss them at Dijon with our European colleagues. These are all grand formal discussions, additional to the continual flow of less organized talk and writing and to the regular work of university governing bodies, Vice-Chancellors' and Principals' Committee, U.G.C., D.S.I.R. and so on. Nor is it true, as Lord Simon rather suggests, that this is all a private professional discussion. A great deal of the discussion is brought to bear on Ministers and is known to those Members of Parliament who interest themselves in the universities. The Ministers most immediately concerned are the Chancellor

of the Exchequer, the Lord President, the Minister of Education and the Secretary of State for the Colonies. But other Departments—Health, Home Office, Agriculture, Supply, etc.—have their own special links with the universities. In short, there is a great mass of discussion of short and long-term subjects constantly going on and constantly being transmitted to the many publics interested in the universities through a quite adequate range of national, regional and professional contacts. Lord Simon ignores all this, though I do not suppose him to be ignorant of it.

If there are gaps in this activity of discussion and consultation they are not of the kind that can be suitably plugged by Royal Commissions. Much more practical help can be expected from the committee of inquiry on a selected topic, such as the Gater Committee or the Willink Committee. No doubt there is scope for more employment of this device.

With Lord Simon's chief pre-occupation—more planning under special Ministers, producing a detailed national strategic plan for universities—I find myself quite out of sympathy. It is right and inevitable that the Government should state clearly and responsibly the demands which the nation needs to make on the university as a condition of supplying them with the resources they require. But its best hope of satisfaction for these demands, lies in a firm reliance on the independent response of the universities. Lord Simon is right to say the system has so far worked well. Despite its enhanced role in recent years the University Grants Committee has skilfully adjusted the public requirements of the State to the individual conditions of our different universities without damage to their vital independence. To preserve this system as public demands increase requires not only much ingenuity: it requires above all a good understanding of the dependence of the system on the tradition in British universities of intellectual liberty and independence of thought of which the institutional guarantee is some autonomy in government.

II. D. A. BELL

Reader in Electromagnetism, University of Birmingham

A PERUSAL of the titles of Royal Commissions which have been set up during the past fifteen years suggests that their subjects of enquiry fall into three categories: matters which are thought to contain a

public scandal (divorce, gambling); institutions which rightly or wrongly are losing public confidence (Justices of the Peace, the Press); and proposals for which the Government of the day seeks independent support in order that it may take a step forward which cuts across the lines of party policies (equal pay, capital punishment). I am sure Lord Simon does not consider the state of the universities to be a public scandal; but neither, I fear, does he think this is the time for a bold step forward. So we must regard a Royal Commission on the Universities as one of the middle group, an enquiry into an institution which is in danger of losing public confidence—a conclusion which is confirmed by his allusion to a past enquiry into Oxford and Cambridge. Incidentally, shall we ever find a satisfactory name for the group comprising most of the Universities in England and Wales? 'Redbrick' is colloquial and by custom pejorative; 'civic' and 'regional' are, I hope, misnomers, since we hope that students will mostly go to universities outside their home areas; and 'modern' is both ambiguous and subject to exception if it refers to date of foundation. I would like to try 'the English Universities', which I believe was the name given to their constituency when universities had parliamentary representation. This rightly excludes the Scottish universities which are different, but I can only offer apologies to the Welsh for including the University of Wales with the English universities which it so much resembles.

Suppose now that a Royal Commission had been set up, with general terms of reference to enquire into the imperfections in the working of our university system, with special reference to the English universities; and that the Chairman had been given Lord Simon's article as an indication of the background of the enquiry. If I were the Chairman I would say 'It is all very well for Lord Simon of Wythenshawe to present to the Commission every conceivable question arising from the work of universities; but in so far as they relate to academic matters why should the members of my commission be better qualified to answer than the vice-chancellors, professors and lecturers who constitute the permanent body of the universities?' It is no doubt the desire to make the article provocative which led Lord Simon to omit mention of the work which his former university colleagues have already done on some of these problems: but equally in my counter-attack I may say that if university men wanted to hand over all their problems to a Royal Commission, the best thing they could do would be to resign and make way for others

willing to carry responsibility for the conduct of the institutions in which they work.

For example, it is asked 'Has the U.G.C. studied why Britain has so few university students compared with every other advanced country?' This question is only just outside the 'Have you stopped beating your wife' category, for one must first ask what we expect of a university student in this country, and then enquire what proportion of the population should go to the university, and what alternative institutions there are both here and abroad. You may or may not agree with the answers, but the A.U.T. has endeavoured to answer just these questions in its report 'A Policy for University Expansion'. On this issue Lord Simon takes 'every other advanced country' as the model. But his next question but one is 'Why was the development of technology within the universities delayed so long?' Am I not right in saying that Britain and U.S.A. are the only advanced countries which have any technology in the universities? Even in U.S.A. the outstanding school of technology is the Massachusetts Institute of Technology which Lord Simon cites alongside the question 'Should universities pay more attention to general education?' But this Institute of Technology was not founded as a university.

Do university entrance requirements cause excessive specialization in the schools? This is a perennial question which is in the minds of academics, from vice-chancellors downwards, and while on the subject of admissions let us not forget the work of the Committee of Vice-Chancellors on the standardization of procedure for applications and acceptances; would a Royal Commission be better qualified to undertake such work?

'Is it true, for instance, that the average Arts don at Oxford spends about three times as much time in personal teaching as the average don in some regional universities?' Before pursuing the possible consequences one must verify the facts, and this is a simple piece of social research, not a subject for a Royal Commission. (I can only say that it is not true of engineering, for I have enquired of my opposite numbers in this subject.)

Most of the questions posed are ones which I maintain must be answered from within the universities, and there is already within the university world an active pursuit of the answers. If we ever reached the state at which the universities knew neither where they were going nor where they wanted to go, I doubt whether a Royal Commission could inject the necessary leadership into them. But even

were there no questions of this kind, I would still maintain that any committee should be given the minimum number of questions to examine if one wants action to result from its deliberations; and there are just two questions which could profitably be referred to a Royal Commission. The first is whether the administration of universities should be based on the idea that they are corporate bodies, and kept free from an atmosphere of employer-employee relationship. G. E. Aylmer's article in the same issue of *Universities Quarterly* indicates the present departure of the English universities from this principle. The difficulty of examining this question from within the universities is the risk of impairing relations between the several classes of people involved, such as lay members of Council, vice-chancellors, professors, lecturers, and this constitutes the case for enquiry by a disinterested body such as a Royal Commission. The second is how many new universities should be founded. The A.U.T. report on University Expansion proposed that there should be several, and a recent memorandum from Swansea has suggested fourteen possible sites for new universities. On the other hand, the latest report from the U.G.C. makes it clear that they regard the creation of new universities as an extravagance, and apart from the University College of Sussex they have decided that all the additional students shall be crammed into the existing universities. There is an argument that the function of the U.G.C. is to share government money between universities (by implication universities which exist or achieve existence by some means) and not to create more universities. If this is correct, there ought to be a Royal Commission to enquire into the extent of the national need for the founding of new universities and to balance their value against their apparent financial inefficiency in comparison with that of inflating the numbers in existing universities. For these two specific questions I would welcome a Royal Commission, provided it had first been made clear that the universities accept their just responsibility for formulating academic policy.

III. WILLIAM WALSH

Professor of Education, University of Leeds

THE logic of Lord Simon's paper seems to be this: if it is possible to frame a large number of questions about an important, living

institution, the answers to which do not present themselves immediately, then there is a case for establishing a Royal Commission. (It is precisely because an institution may be living and important, growing and influential, that it is possible to frame innumerable questions. Its vitality provokes them. It would be dead if it didn't.) On this logic it seems that there is a good case for a Royal Commission, and indeed for a Standing Royal Commission, not only on the universities, but also on parliament, the press, the churches, the schools, and—one cannot resist saying—even on Lord Simon.

No doubt Lord Simon feels that this is a peculiarly important period in the life of the universities, that this is a time when they have very obviously to transform themselves in tune with the profound changes taking place in society at large. I doubt whether anyone would wish flatly to deny this, although we all suffer from the parochialism of spirit which thinks our own particular period more obviously and profoundly important than any other. If this is, as many would agree that it was, a time of fundamental change in the life of the university, then of course it is necessary that a play of acute and disinterested intelligence be brought to bear upon the universities. One assumes, naturally, that it is continuously being brought to bear, but this could well be the time when a critical scrutiny should be intensified. The question which Lord Simon's paper raises is whether the means he suggests, a Royal Commission, is the best or even the proper agency for performing this function. A Royal Commission, even if it is composed of the most able, informed and independent men, is still a committee. The mind of a committee is not, one feels, the organ which can possess, or direct on the universities, the kind of intelligence required. A Royal Commission by its structure and its antecedents is designed to produce the best evidence available on a specific matter for the judgment of able and independent men. It weighs the evidence and produces recommendations which are the result of give and take, of accommodation and balance. These recommendations are frequently notable for their good sense and most effective when they are concerned with precise issues, or an organization with functions which can be formulated with some degree of exactness. Such an agency could not be an organ for intense creative thought or for penetrating criticism and this is the kind of attention which the complexity of university life requires to be directed upon it.

Lord Simon is of course a very distinguished politician who has

certainly had a good deal to do with Royal Commissions. He will be well acquainted with their structure and functions and the species of attention they are capable of bringing to bear. It is reasonable, therefore, to suppose that he has framed his paper and in particular the questions of which it is largely composed, to be in some degree in correspondence with this kind of attention. What unifies the litter of questions he raises is a certain tone and mind. The feeling I have is that his questions derive as much, if not more, from this tone and mind than from the concrete situation which he addresses himself to. I can only call the mind manifested in this paper that of a *philosophe*, a mind with a pathetic belief in an abstract plan, one in whom a sense of reality is numb. Throughout this paper one gets very vividly the impression that Lord Simon will not be content till a neat blue-print plan has been devised which the universities should then proceed to realize. But the universities are institutions each with its own kind of life, its particular sort of existence, its own concrete situation, its historical setting, its local bias, its own manner of operation. A blue-print capable of being formulated and laid on paper, in any way adequate to this richness of individuality, could deal only with high level abstractions. But the matters with which such high level abstractions could grapple are those which are strongly part of the system of tacit assumptions upon which the universities work. I see no advantage whatever in attempting to translate these into committee language. If the plan, the blue-print, attempted to deal with more particular matters, it would, because of the very variety which confronts it, collapse into an invertebrate huddle.

Let us look at this business about tone a trifle more closely. At one point Lord Simon asks:

> Was Sir Hector Hetherington right when he wrote recently that it is vital that each university should retain full responsibility for its own appointments, should choose its teachers, should settle the conditions of their tenure, and should, if need be, dismiss them? Also, that each university must retain full responsibility for the organization of its courses, and for the character and standards of the instruction given within its walls? Further, was he right when he said that in his opinion these were the only two freedoms which were essential to universities?

It seems to me that only a mind compulsively concerned to get the profoundest moral bases of action formulated in words and agreed to in committee (these being the conditions of respectable and acceptable existence for anything) could possibly ask such a question, let

alone expect it to be solemnly debated in committee. To have such a solemn, humourless, Benthamite pawing with the basic moral assumptions of university life fills one with horror. And for Lord Simon this sort of question is perfectly answerable, and belongs to the same level of interrogation as questions of this kind: How far should non-professorial staff be represented on Council, on Senate? or, Is the administrative system satisfactory? A mind which doesn't understand that such questions exist on wholly different planes is a mind initially unqualified, it would have seemed, to be concerned with university matters. For it betrays the most radical confusion of thought and of standards.

Lord Simon is not only confused about the difference in kinds of the questions he asks, but he is perfectly happy to fling his questions about without any consideration for whether or not they are answerable. As long as something is in the interrogative he is content. He asks, for example, how far the increased available energy made possible by the more liberal teacher pupil ratio has been devoted to (a) increased research (b) work on new subjects (c) improved teaching of students. How can one possibly answer such a question? By what standards would one judge? What could it matter if the research was increased a hundred-fold if it were not good research? What difference would it make what work was done on what new subjects, if the work was not worthwhile and the subjects deserving of attention? As for the improved teaching, how can you speak on this except in absurdly quantitative terms? Lord Simon appears to inhabit not only a statistical universe but even an actuarial parish within that.

Sometimes Lord Simon runs out of particular questions, but even this doesn't stop him asking them. For example, he says, 'From my own experience it seems to me that the normal constitution of the regional universities is excellent . . . nonetheless, has anyone any suggestions to make for major improvements in these constitutions?' 'Has anyone any suggestions to make?' One has the impression that Lord Simon is determined that nobody is going to go unheard about anything. Sometimes one feels that he is using the subject of the universities as an occasion for provoking his audience into some flicker of life very much in the manner of an earnest quiz-master. Some of his own suggestions, and of course the interrogative doesn't conceal very successfully that many of these apparently disinterested questions are really positive suggestions, are of a very odd sort. Cambridge, he says, has about 70 Fellows of the Royal Society,

Oxford about 40—no regional university has more than 12. Then comes the question, Is this a desirable distribution of the nation's top scientific talent? It is not very hard to see that Lord Simon would approve of a particular geographical situation as part of the qualification for a Fellowship of the Royal Society. Or perhaps if a person moved to Oxford or Cambridge he could be relieved of the magic letters which could then be handed over to someone living where they would do more good.

Lord Simon loves to manipulate abstractions. Perhaps the biggest abstraction which he flourishes throughout is the standard by which, in his view, the work of the universities should be judged. On occasions he makes unconvincing gestures towards such things as the freedom and independence of the universities, but the criterion which most moves him, and which is indeed operative everywhere, is this: Do the universities meet the national needs? He thinks of the universities as a combination of great service stations and employment bureaux. It never occurs to him that the 'national needs' may require a much more generous interpretation than he appears willing or able to supply. It may well be that the 'national needs' are, in a deeper sense, not at all of the sort which are presumed throughout his paper. Nor does it occur to him that it is not merely the business of the university to make itself adequate to the 'national needs' as Lord Simon understands them. It is also the office of a university, and one upon which depends to a very high degree the intellectual health and moral tone of a society, to determine the 'national needs' in some senses and to oppose them in others. I cannot see any way in which the 'national needs', as they are understood by the universities, can be served by a Royal Commission which puts to itself the sort of questions that Lord Simon proposes for it.

IV. KENNETH URWIN

Senior Lecturer in French and Romance Philology,
University College, Cardiff,
President of the Association of University Teachers[2]

Not all university teachers like the idea of a Royal Commission on the universities. It is taking a steam-hammer to crack a nut. Our present combination of government finance and university independence is probably the best solution to the problem created by modern

conditions. If, whilst expanding numbers to meet a legitimate national need for more trained men, universities are to retain their basic character, by which independent teaching and learning go hand-in-hand at all levels and truth rather than ideological half-truth is sought, government finance without unnecessary strings is essential.

The danger lies, not in a Commission itself, but in what parliament and the public might do with its report. There are many people today, especially outside the educational field, who might be ready to adopt a 'piper calling the tune' policy. The notion that, when the country pays, the universities should produce the results, not only ignores the practical question of the raw material on which they would have to work, but would be fatal to university education as it is understood in this country.

The universities which help to shape every child in the country, and possibly every industry, must retain their freedom of judgment and their standards: they must not be reduced to degree factories nor to glorified high-schools. The extent to which 'university' education is given to American youth has robbed the term of its significance in far too many cases. That must not be allowed to happen in this country. Further, 'national needs' may too easily degenerate into the needs of a dominant political party and should not be the ultimate consideration.

In this day, university teachers would oppose class restrictions on university education, on the one hand, and numbers for numbers' sake on the other. They have only one criterion: can a student benefit from a university course? If so, a place should be provided.

If university courses were longer, and more initial training given in the university, more students might be able to benefit than is at present the case, but if the three-year course is to continue, the criterion must be geared to our existing degree standards: it is pointless to devalue it merely to produce a larger number of nominal graduates if their knowledge and ability are to be far below those of our present graduates. Extension of numbers is still possible, chiefly in the General degree courses and, perhaps, in specially created scientific courses designed to produce people mid-way between technicians and scientists, but that must depend upon (i) adequately prepared entrants, (ii) increased staffing and facilities, and, in my view, on (iii) the provision of additional universities. To secure extra staff would involve a frank recognition of the university teacher as a professional man, commanding a professional salary: the question would

have to be, 'What should he be paid?' and not, 'How cheap can we get him?'

Many of the questions put forward by Lord Simon (on some of which the Association of University Teachers has published reports from time to time), could be dealt with if three changes could be made:

1. The functions of the U.G.C. could be extended. It is an excellent body, doing work which is much appreciated by the universities, but it suffers from having too much work to do, and from an inevitable remoteness from the day-to-day life of the universities.

The first weakness could be remedied by granting it the right to co-opt members for ad-hoc committees and these committees (which should include university administrators and representatives of the A.U.T.) should examine some of the questions raised by Lord Simon and report back to the U.G.C. who, if it adopted the report, should forward it as a recommendation to all appropriate quarters, including the universities.

The second weakness could be dealt with by a change of the terms of reference of the U.G.C. With its wide experience, it could be empowered to make recommendations direct to specific universities. The U.G.C. has earned tremendous good-will within the universities and its recommendations must be seriously considered, though they should not infringe autonomy by becoming directives.

2. The Vice-Chancellors' Committee should become a formal body. Though an informal committee, it is far from being uninfluential. Indeed, one of the more important developments of recent times has been the growth of this committee. It would be disingenuous to suppose that it has not, most usefully, enabled university administrators to unify policy on many points. It has also greatly strengthened the power of the individual Vice-Chancellor *vis-à-vis* his lay Council. At the same time, its informal status may enable it to avoid action at a national level on some matters of importance to university teachers: on such occasions it can become a Cheshire cat and dissolve, leaving behind only a grin—or a frown!

3. The Association of University Teachers should be given complete recognition as spokesman of the university teacher, corresponding to the Vice-Chancellors' committee as mouthpiece of university administration. Universities and university administration are not necessarily synonymous, and, in many matters, the academic view may be as relevant as, or more relevant than, the administrative, e.g.

in matters of matriculation requirements, sabbatical leave for research projects, and so on.

Further, with the great increase in university staffs and in Treasury assistance, university teachers feel strongly that certain matters, such as minimum salary scales, promotion methods, staff amenities, etc., are no longer purely a matter for the individual university. The A.U.T. does not seek to impose the dead hand of complete uniformity on all universities, still less a political hand, but it should be accorded the right, in matters affecting its members, to negotiate on uniform *minima*, whilst leaving the individual university free to do better if it can, and this can be done only at national level. Its present right to discuss salaries and superannuation with the Committee of Vice-Chancellors should be extended to discuss other matters.

The interests of administrators and teachers cannot always be identical, but they must surely be at least complementary. The present hierarchy should therefore include the A.U.T. as an equal with the Committee of Vice-Chancellors in relations with the U.G.C. and the public.

NOTES

[1] Vernon and Mansergh, *Advisory Bodies*, pp. 25-26. The authors suggest a good example of the kind was the Royal Commission on Location of Industry.

[2] The A.U.T. has not yet discussed the questions dealt with by Dr. Urwin, so that the views expressed are his own.

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The May issue of *Universities Quarterly* will include two further contributions to this discussion, one from Oxford and one from Cambridge, together with a reply from Lord Simon.

AMERICAN EDUCATION AND THE BRITISH COMMONWEALTH

C. W. DE KIEWIET

President, the University of Rochester, U.S.A.

THIS article was delivered as an address in Washington, D.C., before a gathering of British Commonwealth Vice-Chancellors and a large number of their American colleagues. The address was inspired by a great deal of informal discussion which had taken place between British and American educators on the role which American higher education might play in the less well-developed areas of the Commonwealth. It was my thought that I might render a useful service in drawing attention to a problem which is not well understood. It was not my intention to be controversial, although the idea of American educational activity in the Commonwealth is itself controversial. It is only natural that men should raise their eyebrows at the thought that American ideas and practices should be imposed on the pattern of education being actively developed in Central Africa, East Africa, Ghana, Nigeria, and elsewhere. It is a fact, however, that since World War II there has been a very considerable flow of American educators and educational ideas and practices into the less well-developed societies of the world. Mainly under the auspices of the International Cooperation Administration a wide variety of American educational institutions have rendered what may be called educational aid in the Philippines, Formosa, Ethiopia, and elsewhere. Some of this aid is very good. Some of it is very indifferent. There is the real problem. It must, I believe, be taken for granted that American ideas and practices will, for a great variety of reasons, find their way into parts of the British Commonwealth hitherto relatively untouched. There is no room to discuss these reasons. The problem we must face is whether the flow of American influence will be untidy, disturbing and damaging, or whether, since apparently it will occur, it can be guided along constructive lines.

The British Commonwealth is well within a second great era of grants of self-government and autonomy. The first began a century and a quarter ago with the Durham Report and ended with the Act of

Union for South Africa in 1910. The second began after World War II. We cannot be certain exactly when it will be consummated. We can be certain that history will not permit a leisurely 80 years to be available. In the first era the pace was unhurried, and each constitution in its generation gave an impression of appropriateness and balance. The societies of Canada, Australia, New Zealand, and South Africa were not merely politically ready, but possessed a degree of economic, social, and educational readiness which gave substance and stability to the constitutional grant. I do not remember any debate on the banking system of Canada or Australia, on the number of teachers, newspaper editors, lawyers. But there was always an implicit understanding that these societies took their steps into political maturity when they also had a proper equipment of skills, professions, economic and cultural institutions, and when especially they had a social compactness and homogeneity.

Today political development is forced to follow a schedule that substitutes years for decades, or more strongly minutes for hours. The pace is hurried and there is not, cannot be a sense of balance. Political change has forged ahead so fast that economics and education are labouring far behind. Yet all the wisdom that we have acquired from history tells us that the balance of an earlier age is still imperative, that political readiness has less meaning unless there be also economic and social and educational readiness. This is why a new word has come to stand beside the old words of self-government and autonomy. The new word is development. Once the slogan was 'no taxation without representation'. The slogan has come to be 'no independence without development'. Constitution making is no longer merely a political process. It needs to be accompanied by co-operative economic arrangements undertaken to close the gap between a mature constitutional order and an immature economy. Implicitly the new societies are exacting a price for their own freedom, namely that development shall not be halted. This makes poverty a source of power.

No matter how we order the items of development—communications, agriculture, industrial production, health—we cannot escape the conclusion that education is basic to them all. It is in contemplating the needs of less developed societies that we can fully recognize the key role of our schools, colleges and universities as the fountainhead of all power, prestige and prosperity in our own societies. More than any other element in society has the teacher, the scholar, the

scientist, the intellectual moved to the centre of national power. I shall not be accused of falling a victim to the current hysteria about Russian education if I say that Russia has already proved that an underdeveloped society must place a specially large and resolute proportion of its resources at the disposal of its educators and scholars. There is no preachment or admonition that needs to be more often repeated than this.

On these things we are agreed amongst ourselves. It is becoming clear that out of this agreement there can develop practical co-operation. Education in the British Commonwealth and education in the United States no longer talk at arm's length about their differences, but face to face about their common purposes. The assumption that American educational ideas and experience have a role to play is thus happily not an utterly presumptuous one. Since American foreign policy has itself undertaken costly programmes of aid towards development, it is even mandatory that it depend upon the assistance of the best and wisest elements of American education.

I greatly fear, however, that characteristically we have plunged forward hastily as if anything and everything we might do or say would be beneficial. Few people, even those who are deeply concerned, have a full knowledge of how extensively a great variety of our institutions have become active in the underdeveloped areas of the world. I am sure that we in America must undertake an exercise in self-criticism before we go farther.

The nature of American history and the manner in which it is often taught persuade most Americans that they are an anti-colonial nation, with a natural sympathy for the 'rising expectations' of backward and colonial peoples. That Americans are against colonialism does not mean that they understand colonial peoples. One must have a really profound knowledge of American history to know competently which aspects and elements of that history have meaning for Africa and Asia. Because many Americans have only a superficial acquaintance with their own history, they are prone to superficial and naive judgments. I have time to refer to only a few of such judgments. The most naive is perhaps the belief that a documentary or legislative act of independence such as a constitution is all that is needed to amend the colonial relationship. In this belief the Algerian problem would be solved by giving the Algerians independence, or the South African problem would be solved by giving the black population the vote. There is no paper passport to prosperity.

Our greatest danger may be the mistake of assuming that American history, and American education spurred by American good will and American enthusiasm give a comprehensive answer and a superior educational formula that must be made available as soon as possible. Think what a massive export of Teachers College Columbia would do to Commonwealth education! On the other hand, think of what it would do for American education!

There is such a thing as an imperialism of the mind, a feeling of responsibility for too many things. Americans are disturbed by the accusation of imperialism against themselves. Yet it takes a cool and detached historical intelligence to recognize how much American thought and affirmation can sometimes resemble those of the Russians. For fifty years there has been an implicit and unexamined ideological alliance between Leninist anti-imperialism and American anti-colonialism that goes a good deal of the way to explaining the headlong rate of change in Africa and Asia. Our tendency in foreign policy to twist our anti-colonialism into strategic weapons and alignments against Russia does not correct this picture.

We are exposed to two more hazards which this act of self-criticism must take into account. The American educational system is the costliest in the world. We are told that it is also the most wasteful. But the great urgency for development in Africa and Asia is created by poverty, underinvestment, and a savage competition for inadequate funds. Not all the technical aid, loans and investments that are realistically in sight can do more than correct a proportion of the grim facts of poverty. A doctrinaire offer of even the very best and most superior achievements and discoveries of American education would be no more than a mirage unless there is a balance with trade and taxes, industry and investment, profit and progress. An education system can only be as costly as a nation's economy will allow. Africa and Asia are still poor.

And now for my own favourite King Charles's Head. Our greatest handicap must continue to be our own ignorance of the peoples and the cultures to which we feel that our educational system and experience can apply. The education of the great majority of Americans is based upon a curriculum which largely ignores the life, the historic experience of the non-western people of the world. At the beginning of the modern period after the major task of geographical discovery had been completed, the western mind recognized that it could not deal with a greatly expanded world with the mental equipment and

education of the limited medieval world. For over a century a process of reassessment, of adjustment, of the incorporation of new knowledge, went on. Today we stand in much the same position. We are in the presence of new peoples and forces which we understand in the most imperfect manner. Our curriculum drawn from the culture of the Mediterranean and Atlantic basins is inadequate, even archaic. More than once after Sir Hector Hetherington spoke at Montreal there was evident a deep concern lest the influence of the humanities falter before the brash pressure of science and technology. Yet not once was there the admission that the humanities had not always been adequate to their mission. In the middle of the twentieth century when the west has to share the initiative with China and India, with Asia and soon with Africa, how can the humanities deserve their title unless they incorporate within them the classics, the philosophy, the history of peoples with whom we can work only if we understand them, as we here represented understand one another. We shall have made the adjustment and reassessment needed in our generation when it will not be academically decent to teach the history of the expansion of the American frontier and the settling of the American continent without teaching also something of man's conquest of forest and plain, climate and distance in Russia or China; when medieval history invokes the aid of anthropology, when the disciplines in our universities recognize that Asian or African society falls only imperfectly and often not at all into the functional divisions which they undertake to study, when economics, history, philosophy and political science recognize that the great western themes of Church and State, mercantilism and *laissez-faire* and many more cannot be fruitfully transposed without adjustment into the education of an Asian or an African. This is one reason why we can only applaud the announced intention of the newest university institutions of the Commonwealth to take up some of the unfinished task of naturalizing a new body of knowledge in the ancient disciplines.

It is our proud idea of progress that makes us in America feel that we are on the forward frontiers of human experience in all things. Some of the grossest errors of our foreign policy are the individual expressions of a general inadequacy in our curriculum. When the gifted men who wrote the Report of the Royal Commission in East Africa said that the African should become modern man they did not mean modern American man, or modern English man, or least of all modern Russian man. This is the best way I know of

saying that what is needed is a broad and imaginative approach which tries to see Asian and African education in the wide context of the political and economic and social environment which new governments are seeking to create within their own countries, and which above all will respect the institutions which British education has already established.

This is perhaps where I should stop lest I fall into the trap against which I have warned others. Yet briefly and therefore imperfectly I wish to indicate a few areas where American experience will repay sympathetic scrutiny. Before I do even this, there is a problem for which I have no present answer. Can there be established in the United States a mechanism or an agency which can give guidance and orderliness to the flow of people and influences into Africa and Asia from the American universities, or must we accept as a natural consequence of the decentralized character of American education an uncontrolled *laissez-faire* flow of the good and the bad, the presumptuous and the well-considered? A slatternly marriage between non-Western inexperience and the poorer content of our educational system would spawn confusion and resentment. But the proper agency, if it can be created, could do much to establish a working alliance between the best in the Commonwealth and the best in the United States. Some of the great load which the senior universities of the Commonwealth have borne could possibly be shared by responsible American universities. This is a suggestion which men of good will in America and the Commonwealth might at least discuss.

I would suggest that you let us help you take a look at what can be called the dual mandate in American education—quality and quantity. In the last 100 years of American education, there has been a great deal of compromise with quality, so much so that for a very long season much of American education was described in terms of this compromise. It would be an error not to admit readily that even today there is still a great deal of compromise with quality in the American system of education. The existence and the somewhat exclusive composition of the Association of American Universities is indeed based on the feeling that the qualitative differences are so significant that 41 Universities feel entitled to form a special group. Two questions need to be answered. Was the American acceptance of mass education and all the attendant compromises with quality an historic error from which we are only now beginning painfully and expensively to extricate ourselves? Or was there an implicit historic

wisdom in starting boldly on the road a hundred years ago even though the equipment was poor and the travelling clumsy? I wish to draw attention to the very real possibility that my phrase 'implicit historic wisdom' is meaningful and valuable. I am convinced that it is. Alfred North Whitehead said that romance must precede precision. The nineteenth century American attitude to education was romantic, optimistic, and uncritical. But it seems always to have had an instinctive sense of distant destinations that were the true goals. Today some of these goals have been achieved in a fashion that attracts the attention of the world.

I would suggest that you let us help you take a look at the manner in which American education has helped to create social coherence and political stability. In many territories of the Commonwealth there is the immensely urgent problem of the gap between a westernized leadership and those whom they rule. Here is a phenomenon at the same time unbelievably complex, and dangerously easy to discuss in glib platitudes. And so I proceed on tiptoes with suggestions and certainly not with firm answers.

The relationship of an elite or ruling group to the rest of the people is vital. In France the aristocracy of the eighteenth century was exclusive, impenetrable and insensitive. Clearly one of the secrets of a successful democracy is a high degree of social mobility, and this is possible only when the upper levels of the social, economic and governmental hierarchy can be easily reached from below. When Tocqueville visited Great Britain in 1833-1835, it was still possible to believe on the evidence of conditions in the factory towns that the French Revolution had been postponed in Great Britain. When Tocqueville revisited Great Britain in 1857 he wrote:

> It is the greatest spectacle there is in the world; though not everything there is great. Above all one can see things there which are entirely unknown in the rest of Europe and the sight of which has comforted me.
>
> I see no reason to doubt that there exists among the lower classes a certain number of sentiments hostile to the other classes; but one does not perceive them. What one does see on all sides is union and agreement among all those who form part of the educated classes from the humblest tradesman to the highest ranks of the aristocracy—agreement to defend society, and to conduct its affairs together and in freedom. I did not envy England her riches and her power, but I envied her this. And I breathed more freely on finding myself, after so many years, away from those hatreds and jealousies between the classes which after

having been the source of our woes have now deprived us of our liberty.

Clearly part of the emphasis in this splendid tribute must be upon the use of the phrase 'the educated classes from the humblest tradesman to the highest ranks of the aristocracy'. I submit that this relationship is a major goal to be sought by education in Africa and Asia. Because of its historic origins, American society early acquired characteristics and assumptions that made relatively easy the establishment of a flexible and co-operative relationship between social and economic groups. But in the decades between the Civil War and the Second World War, American society had to solve a problem uniquely its own. To these shores came a throng of men of the greatest variety of language, creed, national origin and personal circumstances. That these people finally became a society greater than its social components, and a society that did not split apart into fragments under the shock of wars is the outstanding achievement of the last century in this country. In this achievement the role of elementary and secondary schools is outstanding. Whenever we declaim against them, as increasingly we are doing, it would be only fair to recognize that they wrought well in this historic task. But I must not stay with this theme, but proceed now to my main conclusion. It is that the American educational system has had a recent experience in solving a problem which has become one of the most serious problems of the non-western world. I shall, I trust, protect myself against the charge of using superficial analogies, by saying immediately that I fully recognize the great difference in religion, race, caste and tribe that make comparisons difficult. What I believe I can safely do is to make the following point: that America has had an experience which can helpfully be added to that of the Commonwealth in giving to these new societies the consistency, stability, compactness, flexibility which we know to be essential to their prosperity and happiness.

I would suggest that you let us help you take a look at our experience in bringing a wide range of institutions—professional, technological and traditional—under the same academic roof. The state university is the parent of some of the most valuable academic reforms in American education. The persuasion that two or three institutions on the Atlantic Seaboard are the cause and source of all excellence and growth in American education is an illusion shared only by the uninformed. It was the land grant institution with its experimental and occasionally raffish openmindedness that brought

learning and research closer to the lives and interests of a new people struggling to control their environment, and gave dignity to pursuits that had had no classical roots. The excesses and even nonsense of which these institutions were sometimes guilty were but the shadowside of an enthusiasm for knowledge and a desire to apply it as widely as possible. The open frontier between university and society brought about understanding and support. The presence on the same campus of students of technology and literature, nursing and physics, agriculture and history, pharmacy and mathematics, took the idea of the university into the entire community, and took concept of efficiency and excellence into occupations and pursuits hitherto closed by traditional ignorance.

There is more, yet this must suffice. May I say this? I have tried to raise my voice against a brash and unwanted intrusiveness on the part of American education. I have tried also to express my opinion that the trends indicate some role, especially in Africa, for American experience. If this is to be so, this role should be as constructive as possible, and certainly seek the understanding and co-operation of those already on the spot. These are aims easily expressed, but difficult to achieve. They call for the greatest wisdom, the fullest consultation, and much patience.

NEW HOPE FOR ADULT EDUCATION

F. MUSGROVE

Lecturer, Institute of Education, the University of Leicester

WHILE it is possible that Margaret Mead's pioneer writings on child-care and adolescence in primitive cultures, which first appeared more than a quarter of a century ago, have been received too uncritically and have had too great an influence on educational thinking both here and in America, it is doubtful whether the significance of her recent major work, *New Lives for Old*, 1956, has yet been fully appreciated. This study reinstates the adult as a ready pupil. He is no longer fighting a rearguard action against new worlds fashioned by militant adolescent peer-groups. He is capable of re-education and of changing the direction of his adult way of life almost regardless of the nature and limitations of his earlier education in its broadest sense. For the Manus of New Guinea transformed their society in the 1940s under the impact of massive (American) culture contact, in a manner unthinkable to the anthropologist making observations in 1928. The new society did not grow slowly upon new methods of child-rearing and juvenile education: the change was made by adults who had already mastered the traditional culture and were at home in it. The juniors followed in their wake.

We see from this study that the child is no longer necessarily the father of the man. The burden of responsibility for building new worlds can no longer be placed conveniently on the uprising generation and on juvenile education. The disappointingly meagre consequences for adult society of enclaves of 'progressive' education have for long pointed to the same truth—that the adults always win, 'progressive' youths conform as adults to established ways. It is right that in England at least the communist opinions of young men of the 30s are not regarded as diagnostic of their present attitudes and beliefs. We know that for the most part they have been reduced as adults to unexceptionable social conformity.

Margaret Mead's latest social analysis should do much to liberate educational theory from the pessimism and determinism that have

stemmed from Freudian psycho-analytic theory. It is clear that all is not lost or won by the age of six. When Bertrand Russell wrote *On Education* in 1926 he dismissed 'character' education after the age of six as complete: the school could only concentrate on intellectual excellence and agility. Similar assumptions regarding the all-important influence of infancy on the future adult have led anthropologists, particularly Americans of the Kardiner-Linton school, and educationists (including students of delinquency) to direct their attention to significant child-care methods and institutions. New attitudes, new values, new learning contrary to the direction pointed by these early experiences, are scarcely hoped for. 'One generation of courageous women would transform the world', wrote Russell. A noble world could spring only from an appropriate cradle.

The key significance of early upbringing remains a firm belief of educationists in spite of the accumulating evidence of the capacity for new learning by adults. The undue stress on antecedents has taken the hopefulness out of English education, both juvenile and adult. But it is becoming clearer that basic learning can appear at any age if the rewards are sufficient. Anthropologists faced with evidence of culture change are concerned to stress incompleteness and cultural continuities. But Ruth Benedict had no easy task to delineate, in *The Chrysanthemum and the Sword*, cultural continuities in post-Meiji Japan. Japanese adults, without any prior preparation in childhood, learnt a new culture in the closing decades of the nineteenth century. When the author of this article went to teach the children of African tribesmen, he approached his task with some scepticism. Since children made effective contact with the representatives of Western civilization only as young adolescents, and since indigenous child-rearing methods were unchanged, it seemed unlikely that more than 'marginal men' with Cambridge (Oversea) School Certificates could be produced. In fact acculturation was far more complete, in many instances, than orthodox psychological and anthropological theory could allow. The infant Bantu African was at best but a step-father to the educated Bantu man.

The tutor in England may be forgiven some scepticism about the possibility of generating any real change of thought and attitude, a critical re-appraisal and, if necessary, re-adjustment of their own position, in an extra-mural group of mature workers or in an Institute of Education group of seasoned teachers with long experience in classroom and commonroom. But changes in attitude and acceptance

of new ideas do take place. While some students will seek and find confirmation of cherished illusions, and others will retreat before the conflict of evidence offered by their fellow-students, their tutor and their reading, the majority will recast their attitudes and opinions as a result of their experiences over a year or more in the student group.

The capacity of adults for new learning which has no foundation in their childhood experience, for 'culture change' in maturity, is evident not only in America, a country of European immigrants who became Americans in adult life, but in the social changes that have been attendant on internal migrations in post-war England. The housing estates for working-class families from Oxford and Bethnal Green, admirably described by Mogey in the case of the former, and by Willmott and Young in the latter,[1] provide evidence of the acceptance by adults of patterns of living markedly different from those in which they have grown up. The dissolution of old neighbourhood groups has liberated the capacity to learn and adopt a middle class culture.

The social change described by Margaret Mead, Mogey, Willmott and Young, is undertaken by whole communities, and not by individuals in isolation. It is the adult in the group with whom the tutor in adult education deals, and it is the adult as a group member who is capable of revising and rethinking his opinions and attitudes. Our knowledge of group dynamics makes it clear that new learning will come through group interaction, novel propositions and ideas will be considered by groups, and often accepted by them, which would be rejected by the individual student.

But Margaret Mead does not wholly escape the determinism of youthful upbringing in her latest analysis of culture change in Manus. The seeds of change, or of the disposition to change, are to be found in childhood: it is the discontinuity between child life and training and adult life that produces 'latent deviance'. The Manus child was reared to develop a few physical skills and moral attitudes (towards sex and property) but was otherwise unprepared for adult life. The sudden and irksome responsibilities of adulthood were a shock which created a suppressed antipathy to the traditional life. We have our own discontinuities between youth and adulthood—probably greater in the middle than in the working classes—which similarly predispose our adults to accept change and to be relatively unfettered by tradition.

By ever prolonged schooling and tutelage in segregated institutions

our young, like the Manus formerly, are condemned to cultural non-participation. The shock of the young arts (or science) graduate entering industry or commerce was not felt by his forebears who entered upon apprenticeships at the age of fourteen. The adults in our tutorial groups are not so uncritically and indissolubly wedded to the dominant pattern of our adult society as to be incapable and unwilling to rethink its basic problems and assumptions.

The mature are, in fact, rather less likely to be 'set' in their ways, their thinking and their habits than the young who are disciplined by the prestige of their seniors and, like Piaget's youngsters at their marbles, inclined at least before puberty to regard established rules as sacrosanct. There is, moreover, a further social fact, not touched on by Margaret Mead but illuminated by other anthropological writers, which suggests that an hierarchical and stratified society, such as our own, will tend to produce adults capable of eager consideration of new ideas. It is the socially stratified and politically hierarchical societies of Africa which are today most responsive to culture contact, to the new learning of the West, unless the stratification is considerably modified by other cross-cutting institutions such as communal feeding and equality of food consumption among the Ngoni of Nyasaland as described by Professor Read. A comparative study of these phenomena is urgently needed. But it seems that in those egalitarian societies, with no hierarchical structure of authority, and in which young men come early to social significance as members of warrior age-sets—such as the Nuer, the Masai, the Nandi, the Meru, the Teso and the Logoli—there is less disposition to question traditional life and to turn to new ideas; while the hierarchical Baganda, Banyankole, Mende, Ngwato and Azande experience sufficient frustration to question, at least by implication, their social traditions and to learn new ways. It is possible that the inspiration to many pioneers of adult education, William Morris's *News from Nowhere*, would lead in its realization to a society in which adult education would have neither point nor interest.

NOTE

[1] See Mogey, J. M., *Family and neighbourhood: two studies in Oxford*, O.U.P., 1956, and Young, M., and Willmott, P., *Family and kinship in East London*, Routledge, 1957.

THE GERMAN UNIVERSITIES TODAY

G. R. POTTER

Professor of History, University of Sheffield; Cultural Attaché, H.B.M. Embassy, Bonn, 1955-57

IN the much smaller university world that existed before 1914 it was relatively common for the British scholar who hoped to achieve eminence in his subject, or even merely wanted to be sure that he was fully acquainted with its essentials, to spend a term or two in Germany. He tended to make for Berlin, Göttingen or Heidelberg and in general he returned well satisfied with what he had seen and learnt.

Since the two world wars, occupation and inflation, restrictions of every kind, the Nazi regime blotting out the thirties, the division of Germany after 1945, devastation, and the effort to regain lost ground, even also the tremendous pull exerted by America, have prevented any resumption on a larger scale of what was once almost usual. The German university scene today is less well known in university and college common rooms than was once the case.

There are indeed such apparent marked similarities between the universities of Germany that it would be easy to suppose that they were less variegated in pattern, purpose and population than their English, or even British, counterparts. It is, moveover, true that Germany, and indeed the Continent as a whole, has no precise equivalent to Oxford and Cambridge, while the reformers of the early nineteenth century did their work so thoroughly and so well that historical differences between the German universities were obscured. None the less these do exist and in some measure they determine even present-day repute and special interests. Heidelberg, for example, owes much to antiquity; partly because it is the oldest university with a continuous tradition, where Prussian influence was long resisted, whither the wealthier, and sometimes rowdier, students used to gather and where the professors were of singular eminence and of proverbial aloofness. All this has made Heidelberg more typical than in fact it is. American money and good will have not

been lacking to repair wartime damage in that ancient Palatine capital; yet its noisy bustling streets seem somehow as alien from the sleepy city of the last century as do those of Oxford from the days of Mark Pattison and dreaming spires.

A majority of the 18 universities of the Federal German Republic claim medieval, or at any rate Reformation, precursers, although some, like Mainz and Cologne, are revivals after a long interval of lapse and have little more than a nominal continuity. In the days of the independent German princes the existence of a university was a demonstration of their authority, a sign of sovereignty and a necessary training ground for officials and administrators.

The overthrow of Napoleon and the emergence of the Germanic Confederation were accompanied by an up-surge of nationalism; the creation of the University of Berlin (1809) was specially significant. For the restored Hohenzollerns were determined that all that money and government pressure could do to create a great centre of research and teaching should be done, and that freedom of teaching and freedom of study were not incompatible with a narrow concept of Prussian patriotism.

In spite of isolation, class consciousness and exclusiveness the University of Berlin, associated with the name of Wilhelm von Humboldt, became the type of the state university. It had admirable buildings (in the Russian-occupied sector from 1945 onwards), adequate funds and the pick of the German professoriate, so that in some respects the University of Berlin set the pattern for the rest of Germany. Pure scholarship was encouraged, and from it came great and typical series of ponderous publications.

The creation of the Free University of Berlin after 1945 has raised a problem of great significance, for in many ways it has again set a model for others to follow: its buildings are perhaps the best of their kind in the post-war world while the freedom and enthusiasm of the students are matched by the eminence of the much-tried teaching staff. Everything about Berlin, however, has an air of transitoriness and uncertainty so that, from being a norm, it has, at any rate in atmosphere, become something of an exception.

The German university revolves round the professors. There is no permanent rector or vice-chancellor, this important office changing annually, the holder being elected by the professoriate. In practice, seniority and rotation among the Faculties determine the appointment of the Magnificenz and this method of annual tenure, with

grave disadvantages so far as continuity of policy is concerned, is welcomed. It means that a scholar is not diverted from his research and teaching-duties for more than at most two years, and it means that a considerable number of professors have had experience of the glories and the pitfalls of the highest office.

The professors themselves are appointed by the Minister of Education for the *Land*, acting on academic advice. This advice may be slow in coming, for an eminent professor from another university has often to be persuaded to transfer his allegiance by special inducements, either in emoluments or equipment or special facilities for his own work. Once appointed he is professor for life; retirement from active teaching at the age of seventy leaves him with both title and official salary although without the considerable proportion of the latter which is derived from class fees.

The title of professor, whether 'ordinary' or 'extraordinary', the former corresponding roughly to the British head of department or the American 'chairman', is highly esteemed. In a country in which the pursuit of nominal indications of rank has always been notorious, the *Herr Professor* enjoys a social prestige, shared by his wife, which is perhaps higher than anywhere else in the world. Young Professors are rare. Not only is the doctorate, seldom secured much under the age of thirty, indispensable, but so also is the additional *Habilitation*, the certificate of competence to teach, based on published work, together with formal permission to lecture (*venia legendi*). As lecturer, *Privatdozent*, ill-paid from lecture and class fees, the aspirant hopes after years of experience for a chair in a smaller university.

Just as the title of Professor is carried over into business or profession, so is its indispensable foundation, that of Doctor. The degree is the only one that is in the British sense conferred by the University, the chief other qualifications being the Diploma which, likewise, can be obtained in an immense variety of fields of study. In theory all universities, like all sovereign states, are equal, the final examination is indivisible and certificates of attendance for at least eight semesters (four academic years) are required. In practice there have always been wide variations in the standard required of the final dissertation, which is customarily printed and published, and of the considerable written and oral exercises which precede it. It is also possible to secure the doctorate with special commendation and, in general, a good deal of fuss and some considerable expense are involved in attaining this ultimate goal.

Large numbers of students, of course, content themselves with the professional examination which will secure admission to the civil service, law, medicine or other employment, examinations which are conducted, directly or indirectly, by the officials of the *Land* Ministry of Education.

Entrance to any and all universities is obtained by the school-leaving examination known as the *Abitur*, in which twelve or more subjects are required and which is conducted partly by the school itself with the aid of external assessors and is largely practical and oral. It is notable that the universities in no way control or select the quality of the students who enter; indeed, armed with the *Abitur* they have a statutory right to enter a university provided they pay the necessary fees and submit to certain formalities. The result is overcrowding to a degree unknown elsewhere in the world. The large lecture rooms are packed, the lecture is often almost a public address and attendance is certified without much difficulty. There are advantages in all this; the association in the class-room of many types of young persons, the practical certainty that most of them will transfer to at least one other University, the later common hope of securing admission to the professor's seminar for which evidence of real suitability must be produced, and the existence of smaller groups which pay for class exercises, instruction, and correction of written work by a lecturer or assistant.

Between professor and student the gulf is great. The eminent figure appears, delivers his carefully prepared lecture once or twice a week and retires to his room: in his seminar he may still speak to a comparatively large group, may well expect from them deferential questions and considered observations, but even there knowing few of his hearers by name and having little interest in them, save in so far as still fewer may seek his advice on the subject of a doctoral dissertation to be written under his remote and intermittent guidance.

None the less, part of the reason for the customary movement from university to university is to be able to secure evidence of having come into the remote contact of the lecture room with a renowned scholastic figure. For the able scholar there is much more to it than this.

Generally speaking, the student finds his own lodgings where and as he can, expecting nothing more than a small bedroom with, possibly, facilities for simple cooking. There are cheap meals, unappetizing but plentiful, in the communal student dining-room, the *mensa*,

where earnest conversations are carried on amid the clatter of plates and glasses. If it is a little like the cafeteria service of the Redbrick Union, it lacks all the other amenities of this latter institution.

The student, indeed, relies upon his parents, his relatives and himself for money: there are very few scholarships, bursaries or other grants. There is only a handful of small and rather self-conscious residential hostels for students, mostly built since 1950, proudly exhibited to the unimpressed visitor, but insignificant compared with the lavish residential accommodation of Britain and America. Fortunately, however, there are signs that this hostel tendency, as it may be called, is growing and may soon reach considerable dimensions.

Externally, it must be remembered that the German universities are very new; the original buildings were for the most part destroyed by allied bombing, and the reconstruction of libraries, lecture rooms, laboratories and offices had to have priority over anything else. While, as in England, evidence of new buildings is everywhere apparent, the speed with which these huge structures are completed and in use is surprising. Formerly every student was expected to take part in building operations as part of his acceptance for admission, but this is now a receding memory. There is, at any rate, plenty of land available for building and spaciousness, above all in entrance halls, is seldom lacking.

The German academic year consists of two terms, the first starting in November with a good deal of ceremonial and music, and ending, usually, in March, the second running from May to July. A two-term year, with no terminal examinations, no final honours schools, no external examiners, allows much freedom of movement; it almost encourages, also, the student to earn his keep by securing casual employment. He can, if necessary, stay away for a year without difficulty should circumstances so suggest or compel; he will be a year older before attaining the doctorate, but that is perhaps no serious disadvantage.

Some maintain that the freedom of study in the German Federal Republic has already resulted in a surplus of university trained men and women; that there are too many doctors, dentists, lawyers, architects, veterinary surgeons and even horticulturalists. It is said that under-employment in some of these callings is severe enough to induce a movement of trained men and women into Eastern Germany, but facts and figures on this point are neither readily available nor is their interpretation agreed. But that the numbers attending

universities, including the great technical Universities and the institutes of higher learning and technology, is some 25 per cent greater than in the British Isles is itself a matter of significance.

Attached to almost every university and technical high school are several Institutes for research. Some of these are grouped under the name of Max-Planck into an organization with central office buildings in Bad Godesberg, some are without such affiliation, but they seem to have sprung up with incredible speed and to be working with a sense of purpose and urgency that characterize this age and generation. They exist for the study of law, politics, history and geography as well as for the chemical, physical, biological and medical sciences; they are generously assisted by German industry which relies upon them for recruits.

This assistance, like so much else, is organized, and the patrons who produce the cost of equipment and investigation are praised and fêted. Without a federal ministry of education or direct support from federal funds, the financing of the German universities and institutes of higher research is an exceedingly complicated business. There is much individual and local enterprise, some direct as well as a good deal of indirect civic subvention and a certain amount of uncertainty, over-spending, and living from hand to mouth.

There is no institution in any way corresponding to the British Universities Grants Committee; on the other hand, the connection between the government of the *Land* and its universities (for there is usually more than one) is very close. The Ministry has a known inspector or agent, with perhaps a small staff, in the University city, and through him as well, as directly with the minister and the government, negotiations are unceasing.

That this involves a measure of government control seems both natural and necessary in a country used to the Prussian and Hitlerite tradition and having no other resource to which to turn: that such interference as exists is, generally speaking, in the interests of scholarship and research few would deny. Indeed, sometimes, it is university opinion which affects government. When, in Lower Saxony, a Minister of Education was appointed with an unwelcome Nazi background, the University of Göttingen was strong enough, by protests and public disapproval, to secure his resignation.

Many problems face the steadily growing number of Universities. Is the exaggerated freedom of entry, of study, of movement and of teaching really in the national interest? Must not the student of the

future rely much more upon public assistance in his studies than has been the case in the past? Is there not need for more co-ordination, more discipline and even for more direct examination? Will the younger professors who must soon begin to displace the ageing survivors of the pre-Nazi era show themselves a little less aloof, a little less indifferent to the claims of the community upon their services? Can the Conference of Rectors at Bonn approach in effective functioning the work of the British Committee of Vice-Chancellors and Principals? Must there not be more technical high schools awarding the highest qualifications? And is there not a case for recognizing a greater measure of community between the universities of western Europe? Is not a university of 18,000, as at Munich or Hamburg, far too large?

In an earlier age the wandering scholar was familiar enough: Erasmus was equally at home in Cambridge, Paris, Oxford, Freiburg, Basel and Padua. The universities of the nineteenth century on the other hand, and nowhere more so than in Germany, were the apostles of exclusive nationalism. This has now almost entirely disappeared even if memories remain; the contemporary cry is all for a common university front. To many this seems to call for some greater measure of international recognition not only of periods of study but also of examinations and diplomas. More explanation, more intercourse, more coming and going are surely needed. And for this the German universities are certainly prepared. They have close arrangements with France, far less close with Great Britain. It is much to be hoped that the annual University conference between German and British representatives started in 1947 will continue on a basis of mutual equality and respect.

In 1957 the University of Munich invited more than a dozen British professors to lecture there, each in his own special field, during an 'English week'. It was an experience greatly enjoyed by the participants and can be the forerunner of others. Time, money, and language are serious factors but not much of the former is needed and English is becoming to a growing extent the first foreign language in Germany. It may be that in the years immediately ahead we shall need to share our intellectual and cultural as well as our military and economic resources a little more. No great effort and no large subvention is necessary. But it will not happen of itself, and perhaps it is now for the British universities to show themselves a little more forthcoming.

RECENT DEVELOPMENTS IN EAST GERMAN UNIVERSITIES

ANONYMOUS

THE defection of the Rector of Jena University on the eve of the quater-centenary celebrations has focused attention on the difficulties facing all higher education in Eastern Germany. Since the beginning of the year approaching two hundred university teachers have fled to the West each month, and Western comment has gone little further than to note this effect of what is described as Communist oppression. In this we overlook the fact that in many cases these fugitives assert quite frankly that they still believe in Communism. They have worked with or at least under the régime for ten years and more. This situation is presenting the West German authorities with a curious problem, for it is difficult to bring these fugitives under the heading of refugees from political oppression.

We are, however, not concerned here with the political repercussions to these events. Nor is it profitable to speculate about the political motives that have led to these mass defections. It may well be that the part played by university circles in Poland in October 1956 and in Hungary a year later has now made the authorities in Germany nervous, and we may thus see their recent measures as, so to speak, defensive measures. Yet these remain no more than speculations. There is nothing more difficult than to penetrate to the true springs of action behind the devious manipulations of Ulbricht and his colleagues.

We can nevertheless in the next few moments examine as objectively as possible those recent changes in university policy which have been the immediate cause of the unrest. It must be emphasized in the first place that the vast majority of the recent fugitives are in no sense political figures. In this they are very different from the university professors who earlier fell foul of the authorities. Harich and Kantorowitsch, for instance, were above all things politically active Communists who were out-manoeuvred in the inevitable jockeying for influence and were disposed of by being accused as deviationists. No tears were shed by their colleagues when they fell

into disgrace. These colleagues who now in such large numbers have been driven to turn their backs on their homes and their careers are by and large not at all interested in politics. If they could be left to their chosen work with a minimum of interference, they would be happy to continue making the appropriate signs and noises as required by a totalitarian state.

What is it then that has made the situation intolerable to them during recent months? It is a basic change in the attitude of the Party to university education. For years it has been apparent that in the process of educating students from the working classes they have become alienated from the backgrounds and attitudes of their class. Education has taught them to think and so cut them off from the masses. Drastic measures have now been introduced in an attempt to prevent what is felt to be the disintegration of society. New regulations for admission to the universities were published on March 12th, 1957. As far as possible they were to come into force immediately; after September 1960 their implementation becomes obligatory. The opening paragraph of these regulations reads as follows: 'The further consolidation of the People's Democracy in our Workers' and Peasants' State demands an intimate contact between the undergraduates and the life and thought of the working class and the peasants. For this reason it is required that, beginning in the academic year 1957-58, all applicants shall before acceptance have completed a period of practical activity in industrial or agricultural production. In the course of this practical work the applicant shall give evidence of his solidarity with the politics of the government. This regulation therefore lays down that preference in the selection for university places shall be given to those applicants who have already worked in industry or agriculture.' Among the detailed requirements that follow we may note three particularly interesting points. Application for admission may be made to one university only. A detailed justification is required of the subject to be studied as well as of the chosen career for which it is to be the preparation. And a recently dated 'clean bill of health' from the local police must accompany the application.

The regulations contained no clear indication about the period of the desired practical work. A hint could be found, however, in the recommendation that applicants who were unsuccessful might be accepted for the following year if they spent the intervening time doing the requisite practical work. The fact that twelve months was

intended was immediately confirmed in the press comment which appeared in specialist periodicals during the next few weeks. The university journal *Das Hochschulwesen* of April 1957 emphasized the educative value of practical activity for brain-workers. It dismissed the charge that this proposal was effectively the same as the earlier ill-famed 'labour service' by affirming, oddly enough, that the new scheme remained purely voluntary. The School Leaving Certificate was to be seen merely as a preliminary means of selection; only those candidates who were tested and proved as reliable workmen could be considered as fit for university study. At the same time the teachers' journal *Deutsche Lehrerzeitung* contained an article signed by the Secretary of State for University Affairs with the title 'One year's work before study'. It is interesting to study the technique of this propaganda. Its ostensible purpose was to inform the interested parties about the details of the negotiations which had led to the decision. It was taken for granted that no one opposed the rightness of the decision itself. In fact it appeared as if this solution had only emerged as a result of discussions between the professors, headmasters, parent-teacher organizations and even students and senior pupils themselves. Very significant was the suggestion that the initial criticism of the universities had come from the workers—whether from industry as such or from the trades-unions was not stated. Neither this criticism nor the subsequent discussion is documented in any way. The fact that it is recorded only in this official pronouncement inclines us to see in the assertion nothing more than an elaborate fiction designed to propagate the notion of government as the tool of the people's will.

This new programme is confined to the selection and admission of students to the university; it mentions nothing about the desirability of closer contact between the university staff and the 'real' world of industrial production. This is quite understandable, for in the operation of the system of study-grants the state holds the whip-hand over the students. Yet there is little doubt that the same or similar requirements were at the same time imposed on professors and lecturers. A semi-official hint that such was the case is seen in a speech delivered by the Minister before the Conference of University Rectors. It was reported in *Neues Deutschland* on June 15th, 1957. There we read that 'the universities can legitimately claim to be the highest centres of national culture only if they become in fact the focal points in the struggle towards the Socialist way of life'. It was

necessary, the Minister claimed, 'to introduce a new Socialist style into the content and the form of all intellectual activity in the universities. We cannot conceive of the scientist or scholar in a Socialist state as a man who in his professional work remains aloof from the realities of life in his society. With his heart and his head and with his entire professional organization he must establish a connection with the pulsating centres of material production and with the institutions of society.' The Minister went on to cite with praise how some local authorities had called in university experts to advise on their problems and how the University of Halle had already co-opted leading local industrialists to its Senate. In this connection the Minister criticized the lack of co-operation between professors of German and the practical exponents of German literature. This had shown itself in their absence from the recent Congress of Writers and Journalists. It was as if the professors were not interested in the problems facing the writers who were forging the contemporary Socialist literature. Their preoccupation with the older periods of the language and with mediaeval literature was something the Ministry would have to look into. The threat to the traditional conception of the university was epitomized in one sentence of this Minister's speech: 'We envisage the relationship between our universities and the working class, between the professoriate and the Party, and between the student body and the other youth organizations as a voluntary partnership for consolidated action.'

A special point raised at this conference of Rectors shows up quite unambiguously the sort of interference that so many of the teachers are now refusing to tolerate. The basic course in Dialectical Materialism has been obligatory for all students since 1954. In the main, it has been conducted in special departments by teachers appointed for the purpose. There has long been much criticism that these men, who were little more than Party functionaries, scarcely attained the mental calibre expected of university staff. At this conference it was laid down categorically that the work could no longer be left to them alone. All university teachers, of whatever grade and whatever their speciality, must henceforth accept responsibility for political instruction.

Even in the absence of official promulgations controlling the activities of university staff, confirmation of this new attitude is supplied from another source. The Minister's speech was on June 14th, 1957; on April 1st virtually the same views had been expressed

in a special supplement to the student newspaper *Forum*. This list of proposals for improving the universities emanated ostensibly from the Party Youth Organization. They were, in the words of the closing paragraph, 'submitted for discussion until the end of June, so that decisions could be reached in time for the new session'. An address was given to which further suggestions could be sent. In spite of the six weeks' interval between this publication and the Minister's speech we may well have our own ideas as to whether the students' proposals influenced the Minister, or vice-versa.

A third factor which caused great dissatisfaction among students and staff alike was the revised ordinance relating to visits to Western Germany and other NATO countries. This came into force on June 1st, 1957. Although permission to travel was still nominally granted by the University Rector, he could henceforth only act on the recommendation of the Pro-Rector for Student Affairs, who, if not actually a Party official, normally behaves as if he were one. The effect of this measure was immediately to check all effective contact with the West.

To sum up, it must be emphasized that the recent refugees are not political fugitives in the accepted sense of the term. They are in very many cases still convinced Communists, and their disagreement with Ulbricht's régime should not be equated with sympathy for the Western way of life. The universities are, however, the last stronghold of people who are capable of creative thought and who still think. The Party functionaries cannot tolerate this. In spite of the carefully preserved fiction that discussion takes place at all levels, it is in fact only permitted within a rigidly dictated framework and under conditions where mass responses can be readily manipulated by clever demagogues. The difference between the politicians and the academics may be put in a nutshell as follows. Where the Party says dogmatically: 'Socialism will triumph, because it is true', even Communist universities, if they are to remain universities, must insist on being able to say conditionally: 'If Socialism is true, it will triumph.' The recent measures have denied them this possibility.

BROADER EDUCATION IN A TECHNOLOGICAL DEPARTMENT

D. G. TUCKER

Professor of Electrical Engineering, University of Birmingham

ON the subject of the broader education of technologists—and indeed on the broader education of all people pursuing advanced studies—much has been said and written, but on the whole little has been done. The setting up of the new colleges of advanced technology has led to a considerable re-examination of the broader education requirements of technological students, and the Ministry of Education has clearly stated its views on both the nature and the amount of the 'Liberal' Education in all kinds of technical colleges. Perhaps the most important recommendation is that the total amount of time devoted to this aspect of education may add up to as much as 15-20 per cent of the total course time. Nothing like this is done in the universities, nor is broader education on this scale even contemplated, so far as I know, by most technological faculties and departments.

In view of all that has already been said about the need for broader education,[1] there is little point in repeating any of the arguments here. The need is widely accepted; the difficulty is in providing it.

One of the largest problems of introducing broader education into established technological courses—this is the university problem—is to find time for it in already crowded timetables. It is argued that it is difficult enough to find time to include those technological topics which are considered vital to the technologist's education. It is argued that the complexity of modern science and technology makes it desirable to add more technological subjects to the syllabus rather than to remove any. In my view, based on over 20 years' experience as a practising engineer before coming to the university as professor, these arguments are entirely fallacious. A great deal could be removed from any technological syllabus with quite negligible effect on the technologist's career. It is very doubtful, for example, if even 1 in 10 university-trained engineers ever makes use of the advanced mathematics he 'learns'. This is, of course, partly because there is no need

to use it, but it is even more markedly due to the fact that the technologist is unable to use it. He has passed examinations in mathematics, he has been shown examples of those mathematics applied to technological problems, but he has been unable to learn to think of new problems in mathematical terms. In my view there is no case for increasing the technological and scientific content of undergraduate courses, and present courses can stand considerable pruning. This is not to say, of course, that more advanced technological and mathematical courses should not be given. They should indeed be given, but at the postgraduate level, to students who have had some experience in engineering after initial graduation.

If it is once accepted that time can be found for broader education, then the next problem is whether it should be done for the university as a whole or separately in each department. I think there is a need for effort at both levels. In Birmingham, for instance, the weekly Open Lecture at lunchtime, after a somewhat unencouraging first year or two, has now become a great success, attracting sometimes half the university population. It is, however, at the departmental level that efforts in broader education can be made to have more effect. In a large university, for better or for worse, it is usually the department to which students attach their loyalty. It is mainly the staff of their own department whom they get to know well. It is, therefore, the department which is in the strongest position to influence the students in their thoughts and plans. I think, therefore, it is essential for departments to make a strong individual effort to encourage broader education of their students.

For such departmental effort to be successful, it is essential for the departmental staff to take a large share in the broader education courses. If these courses were left entirely to specialists from other departments or from outside the university the students would not be impressed by their relevance to the life of the engineer. It is the fact that the engineering staff think the courses are important, that they themselves know enough about the subjects to do some of the lecturing, which will most strongly impress the students. It is unlikely, of course, that most departments will have many members of staff able to take part in this work, and, of course, outside lecturers must be used quite extensively. It is probably vital that the head of department should himself play a major role in the broader education courses.

Another vital factor in broader education is, of course, the choice

of the subject matter. I do not think, however, that the *details* of the choice are likely to be vital, provided one general principle is adhered to. This is that the term 'Broader Education' should be taken literally. In other words the student's interest in his technological subject must be used as the starting point and the broadening subjects must spread from his technology. There is likely to be no profit—and indeed there may well be an irrecoverable loss—if the student is merely given new and apparently irrelevant specialisms. I feel the term 'Liberal Studies' is to be deprecated; in my view 'Broader Education' is the correct terminology, and it is the term used at Birmingham. The student must be shown where his technology impinges on other human activities. For example, it affects human relationships, administration by Government and commercial organizations, aesthetics, literature and art. In fact, it is related to almost all human activities, perhaps rather more in the present than in the past.

With all the above in mind, courses of various kinds have been arranged in the electrical engineering department of the University of Birmingham for some years. Considerable activity in this connection was started by my predecessor, Professor A. Tustin, and when I came to the department it already had a considerable tradition of broader interests; it has, therefore, been comparatively easy to extend this into the present pattern, which, of course, is still quite experimental. It was at first thought that the discussion group should be the basis of broader education. The students were divided into groups of about a dozen and dealt with on an informal and comparatively intimate basis in the lecturer's own room. The topics dealt with are described in more detail later. We have not been convinced of the success of this method, however, and later courses have included a considerable content of lectures which are normally 'compulsory' for all students in the year for whom they are provided; attendance of other students is invited. It was early found that these courses could not be made entirely voluntary; the majority of students have initially no interest in broader education nor any desire to be broadly educated. If their interest can be aroused, there is no difficulty in obtaining adequate attendance, but in the initial stages some compulsion is essential. It was found that students think that if a course is not examined, it is not thought by the staff to be important. This quite understandable reaction must be taken into account, and some form of examination provided for all the broader education courses. Both formal examinations and vacation essays have been tried. While

neither is entirely successful, they do have the merit of compelling the students' attention. Students' discussion meetings have been organized at the end of each year; in these, the staff play no part, except to appoint a chairman and then to attend. The students give talks, and conduct discussions, on the various topics that have been dealt with; it has been found that this is most effective in arousing students' enthusiasm and the standard of performance has been surprisingly high.

Great care is taken to avoid any growth of resistance or of a feeling that the work is irrelevant; illustrations of practical situations involving all the factors discussed are given as frequently as possible. Fortunately most of the staff can speak from considerable experience of engineering practice. The choice of outside lecturers is important. It is desirable to choose people who have been reasonably successful in their careers and who can illustrate that they practise what they preach. The course described below on 'Design in Engineering' has given good opportunities for this sort of thing.

(a) *Discussion Groups*

It was thought that one of the objects of these discussion groups, which were held in the student's second year, should be to develop the student's ability to express himself in speech and in writing. One series of discussions was, therefore, devoted to the analysis and reconstruction of the student's own efforts at writing a very short essay on some provocative subject, preferably relating to technology. Errors in English and in style were discussed, causes of spelling errors were examined, and in each case a reconstructed essay was produced which met the criticisms of all members of the group so far as possible. These exercises, curiously enough, seemed to be enjoyed by the students.

In another group the impact of technology on society in the industrial revolution was taken as a general subject, to be examined through good-class novels of the period, such as *Mary Barton* by Mrs. Gaskell and *Shirley* by Charlotte Brontë. This gave an opportunity for the students to read aloud. It may be added that at the beginning their standard of reading was absolutely appalling; they could have had little practice at school. In this course, unfortunately, it was not found easy to stimulate good discussion. In a closely related course, in which the history of the industrial revolution was examined

through one or two good modern books, the same difficulty of stimulating intelligent discussion was found. On the other hand, vacation essays submitted by the students on these topics were of surprisingly high quality and indicated that the students had in fact read fairly considerably for themselves. In no case, however, did the students appear to show any enthusiasm for the prescribed books.

Another group devoted its time to play reading; although this gave less opportunity for developing individual thought, it had a most marked effect on the students' quality of speech. Indeed, a professional examiner, who was invited to hear the students, was full of praise for them.

(b) *Courses of Lectures for Students in their Second Year*

Two courses have been organized, of 10 and 8 lectures respectively; both are given in the same term. The first course is entitled 'Design in Engineering' and is intended to emphasize the breadth of interest in the engineer's life and the breadth of the considerations to be taken account of in design. The introductory lecture by the Head of Department reviews the whole field, describing the criteria of design, such as fitness for purpose, suitability for the proposed environment, relationship with the human user, etc. Examples of good and bad design are shown and the relationship of aesthetics and efficiency discussed. The remaining lectures have been given by practitioners in various branches of technology, including the architect who designed the department's new building, the professor of civil engineering who has had considerable experience of bridge design, a very successful designer of domestic equipment as well as of houses, and the head of an engineering group in a large Government establishment. Members of staff give lectures on several design topics, including one on the effect of discovery on design, and another on design for production.

The second course is on government and management in relation to the technologist; members of the department's staff give lectures on technologists in management (3 lectures), Government research and its influence on industry (4 lectures) and research and innovation in small firms (1 lecture).

(c) *Lecture Courses for Final Year Students*

The main lecture course provided for final year students is intended to provide some measure of integration of the historical, sociological,

economic and scientific background of technology. It comprises about 35 lectures and starts with a fairly rapid survey of the development of technology and its relation to civilization from prehistoric times through the stone, bronze and iron ages. After this introduction, consideration is centred on Britain, and the effect of technological developments on patterns of industry and settlement are reviewed. In considering the period from the eighteenth century onwards, more detailed consideration is given to this question of technology in relation to environment. The consequences of the industrial revolution in regard to the living conditions of the people and to the changes in social structure are discussed quite fully; and several lectures are devoted to the history and present status of trade unions.

The development of British industry into the twentieth century is considered specifically in relation to world economy in another group of lectures, which includes an examination of the manner in which industries and firms develop, a discussion of monetary factors, and an account of the proposed European Free Trade Area.

This main lecture course is concluded by a group of lectures on the influence of scientific research on the developments reviewed in the rest of the course. The course as a whole is very much an inter-faculty affair, although run specifically for the Electrical Engineering Department. All the lectures, except the last group, come from the Faculty of Arts or the Faculty of Commerce and Social Science.

In parallel with the rather comprehensive course described above, a course of 14 lectures is given by the staff of the Department of Engineering Production on the problems arising in the organization of the production side of industry—factory lay-out, management, etc.

The results of the last three years' work on broader education for electrical engineers suggest that this can be successful in the sense of arousing some genuine interest in the topics discussed. The standard of essays submitted has been good; the standard of talks given in the students' prepared discussions has also been good. Impromptu discussion, however, has always proved disappointing. One sign of the genuine interest in broader education aroused is that students of the electrical engineering department appear to have attended the general University Open Lectures rather more conscientiously than most other students.

It should be emphasized that obtaining a pass mark in the prescribed essays and in examinations on the broader education courses,

where these have been held, has been a condition of the award of a degree. In other words broader education has been given the same status as the strictly technological subjects. It has been found that the students who do well in technological subjects also tend to do well in broader education subjects. The worst failures in the latter are those who fail their technological subjects anyway. While this is not an unreasonable result to obtain, it is contrary to many people's ideas that the successful technologist is necessarily (or likely to be) a man of narrow interests. It is encouraging to think that a brilliant technologist can also take his part in society as a person of high education.

NOTES

Although the opinions expressed are my own, the departmental work described has involved six members of the staff; and many other people, inside and outside the University, have willingly co-operated. In particular, great credit is due to Dr. D. A. Bell, Mr. J. T. Allanson and Dr. E. E. Ward who have given a great deal of time, effort and enthusiasm to the experimental courses.

[1] See, for example, 'The Education of the Technologist', three papers by N. R. Hanson, J. Pilley, and D. Krook, *Universities Quarterly*, 11, ii, 1957.

MATHEMATICS IN THE AUSTRALIAN UNIVERSITIES

J. GANI AND A. L. BLAKERS

Senior Lecturer and Professor in the Department of Mathematics, University of Western Australia

AT a time when technological developments in the Soviet Union are causing both Britain and the U.S.A. to re-examine critically their policies on scientific education, it is perhaps fitting to add this brief study of mathematics and mathematicians at the Australian universities to the accumulating data on the state of the sciences in the English-speaking countries.[1] This report is preliminary to a more extensive investigation.

It is acknowledged almost universally that mathematics is a fundamental discipline in the sciences. A substantial part of the theoretical equipment of engineers, physicists and chemists consists of applied mathematics, while mathematical statistics has for many years been in regular use among agricultural, biological, medical and social scientists. No citizen of a technically advanced nation needs to be convinced of the basic role which mathematical applications have played in the recent scientific achievements of our society. But it is harder to make the point that these 'service' aspects of mathematics are not necessarily the most important. There are various specialized branches of mathematics often grouped together under the title of 'Pure Mathematics' which are at present in a very rapid state of expansion. While the motivating force behind creativity in this field is rarely the prospect of immediate application, there is little doubt that the mathematics of today will be the basis of much of the science and technology of tomorrow.[2] The U.S.A., among other countries, is painfully rediscovering the fact that no community jealous of its technological, scientific, and intellectual progress can afford to neglect the mathematical sciences.

The purpose of this article is to examine some aspects of the present state of mathematics in Australia, and a few likely problems of the immediate future. The solution of these problems will not be easy

and will require the combined efforts of mathematicians, educators, and scientists among others. Some suggestions are made for possible action; we welcome criticism and further suggestions.

The Australian universities and their mathematics courses

There are in Australia nine universities and two university colleges. The Universities of Adelaide, Melbourne, Queensland, Tasmania and Western Australia are situated in State capitals; the residential University of New England, the New South Wales University of Technology (with which is incorporated the Newcastle University College), and the University of Sydney are all in the State of New South Wales, the first at Armidale and the last two in Sydney, the State capital; finally the Canberra University College (C.U.C.) and the Australian National University are in Canberra, the Federal capital.

Except for the Australian National University (A.N.U.), which is an entirely post-graduate institution, the universities are principally concerned with the training of undergraduates, of whom about 50 per cent were part-time and external students during 1956. Table 1 below gives some recent figures for State and university populations, and analyses the composition of the student bodies in 1956.

The universities were founded between the middle of the 19th century and the middle of the 20th, Sydney (1850) and Melbourne (1853) being the oldest, and the A.N.U. (1946), N.S.W. University of Technology (1949), and New England[3] (1954), the most recent. Before the last war there was a strong tendency, certainly in the science faculties, to consider the universities as institutions for the professional training of undergraduates; teaching occupied most of the energies of the staff. Since the war there has been increasing emphasis on research, but as was pointed out by the Murray Committee on Australian Universities, this is still inadequate.

Each of the universities except the A.N.U. has a department or school of mathematics, offering a wide choice of undergraduate courses in the various branches of mathematics, pure, applied and statistical; Melbourne has a separate department of statistics specializing in mathematical statistics. As in Britain and the U.S.A., the bigger universities (Sydney and Melbourne) with their larger staffs are able to provide a wider selection of subjects. The standard of the pass degrees in mathematics is thought to be higher on the whole than the equivalent degree in Britain, while the courses and standards

TABLE 1. STATE AND UNIVERSITY POPULATIONS

I Australian States	II State Population in millions at 31.12.56	III Universities	IV Full-time students 1956	V Part-time students 1956	VI External students 1956	VII Post-Graduate students included in IV, V, VI	VIII Total students 1956	IX Total students 1957
South Australia (including Northern Territory) ..	·880	Adelaide	2,225	1,653	374	331	4,252	4,317
Australian Capital Territory	·036	A.N.U.	69	0	0	69	69	67
		C.U.C.	25	415	0	27	440	396
Victoria	2·633	Melbourne	4,519	2,564	461	230	7,544	7,908
New South Wales ..	3·588	N. England	311	26	595	110	932	1,149
		N.S.W. Technical*	987	3,653	0	238	4,640	5,041
		Sydney	5,144	2,787	0	217	7,931	8,318
Queensland	1·379	Queensland	2,048	1,371	1,865	276	5,284	5,709
Tasmania	·333	Tasmania	474	337	64	54	875	1,004
West Australia	·685	West Australia	1,088	837	300	300	2,225	2,356
Total	9·534		16,890	13,643	3,659	1,852	34,192	36,465

* Including Newcastle University College.

for the honours degrees are fairly comparable to those of various British universities excepting Oxford and Cambridge. It is necessary to complete 5-6 courses (or units) in mathematics out of a total of 9-10 courses for the pass degree, while the honours degree usually requires a further year of study. In Melbourne and Sydney, students in the 4-year honours courses follow a different set of lectures from the start, but elsewhere the pass and honours students are kept together for as long as three years; in Queensland honours students are given supplementary honours lectures while completing the pass course prior to their final honours year.

Post-graduate instruction is on the British pattern, with little formal training, a supervisor being almost entirely responsible for students working under his direction towards the Master's or Doctor's degrees. Except for the A.N.U. which has a graduate department of statistics, post-graduate training in mathematics is a somewhat secondary activity of the university departments.

The mathematics students

The first-year mathematics courses at all universities are attended by very large numbers of students. Most of these require some courses in mathematics as part of their degrees in other branches of science, and their numbers decrease rapidly in consecutive years through the large failure rate,[4] estimated at 30-35 per cent over all mathematics courses, and with the fulfilment of individual mathematical requirements. There are approximately half the number of first-year students in second-year courses, and a quarter to a third of the latter in third-year courses. In Western Australia, for example, the numbers in first, second and third-year courses in pure mathematics in 1957 were 229, 100 and 26 respectively,[5] and the proportions in other universities, though differing in details, are substantially similar.

The number of honours students has been small in recent years; during 1957 the total number of students who passed their final honours year at all Australian universities was less than 18. Post-graduate students appear to be even rarer: the number of students in mathematics awarded post-graduate degrees in Australia during the ten years 1947-1956 is given[6] in Table 2 below.

There is some indication, however, that these numbers will increase in the next few years; among others, a few staff members are now completing Ph.D's. on a part-time basis in their own departments.

TABLE 2. POST-GRADUATE DEGREES

1947-56	Master's	Ph.D.
Adelaide	3	1
A.N.U.	1	2
C.U.C.	0	0
Melbourne	12	3
New England	1	1
N.S.W. Technical	1	1
Sydney	22	2
Queensland	5	0
Tasmania	0	0
West Australia	2	0
Total	47	10

In a comparable period, 1945-54, there were 1,516 Ph.D's. in mathematics awarded at recognized universities in the U.S.A. and Canada; this is approximately 150 times the number for Australia, while the combined population of these two countries during the same decade was only about 20 times that of Australia. It is only fair to point out here that whereas the Ph.D. degree in mathematics is well established in America, its award in the Australian universities was begun only some 10 years ago. In addition, the figures quoted do not take into account those Australians proceeding to doctorates abroad before returning to their country. Even when these are included, however, the total number of doctorates awarded in mathematics remains disconcertingly small.

It is interesting to examine some of the reasons which have been proposed to account for the small numbers of students of mathematics following honours and post-graduate courses.

The first reason, most widely advanced, is the inadequacy of mathematics teaching in Australian schools (see [1b]). While it is desirable to make every effort to improve this teaching, we do not believe that the small numbers of post-graduate students can be primarily attributed to school deficiencies. The plight of mathematics in American schools is on the whole considerably worse, yet as indicated above, post-graduate work in America is proportionately much greater than that in Australia.

A second more plausible reason is the persistent neglect of school and university authorities to inform schoolchildren preparing to enter the universities of the openings available to graduates in mathematics. There is in our society a widespread ignorance of the function

and position of mathematicians: little is understood of their work, and equally little is known of the opportunities for personal satisfaction and financial reward open to them in industry, Government institutions and education. This situation tends to orientate many potential students of mathematics towards the more familiar and popularly publicized chemistry, engineering and physics.

A third possible reason for the small post-graduate numbers is the inordinately large failure rate at the Australian universities. The Report of the Murray Committee suggests that this is related to the low ratio of University staff to students (see Table 7), and to the abrupt transition from directed study in the schools to the freer methods and inadequately supervised classes of the universities. Although this wastage is a very serious problem, we do not consider that it has much influence on the post-graduate enrolment; the students who fail are rarely those capable of post-graduate work. However, the problems of wastage and low post-graduate numbers could in large measure be due to a common cause—the serious understaffing of university departments. In this situation promising undergraduates have not always received the recognition and encouragement which so often stimulate advanced work, while the staff have been heavily burdened with undergraduate teaching and have rarely been able to give sufficient attention to the few students who have undertaken post-graduate work.

A fourth reason, related to the second, which has been advanced to account for the small number of honours and post-graduate students, is the competitive attraction of physics (and to a lesser degree chemistry) at the universities; this subject requires similar aptitudes, and sometimes the same course of training up to the third year. Following the spectacular advances in nuclear research in the last few years, physics has become an increasingly attractive subject of study to science students, not only in Australia, but also in Britain and the U.S.A. To illustrate the growth in popularity of the subject, and the increasing influence of physicists and chemists in the U.S.A., we quote the figures for physical scientists who were members of the U.S. National Academy of Sciences in 1943 and 1956,[7] together with the 1957 membership figures for physical scientists in the Australian Academy of Science. The Australian figures show a distribution which, except for astronomers and geologists, is remarkably similar to that for the American Academy in 1956.

Finally, the limited number of post-graduate students is in part

TABLE 3. PHYSICAL SCIENTISTS IN U.S.A. AND AUSTRALIA

	Year	Mathematicians		Astronomers		Physicists		Chemists		Geologists	
		No.	%	No.	%	No.	%	No.	%	No.	%
National academy of of Science, U.S.A.	1943	26	16·3	25	15·6	39	24·4	37	23·1	33	20·6
	1956	33	13·5	29	11·8	79	32·2	79	32·2	25	10·2
Australian Academy of Science	1957	7	15·9	2	4·5	13	29·5	14	31·8	8	18·2

explained by the steady flow of graduates from Australian universities to post-graduate mathematical centres overseas. In the 10 years from 1947 to 1956, 51 students left the country for advanced study in mathematics, after first receiving training at Australian universities: this is almost as great a number as the 57 who secured their Master's or Doctor's degrees in Australia over the same period. Since no Australian university has yet developed a post-graduate school capable of giving advanced training in mathematics of the quality obtainable overseas, this flow of post-graduate students, mostly to Britain and the U.S.A., is not surprising. In fact, considering Australia's comparative isolation from the major world centres of mathematical activity it is highly desirable that some flow of students overseas should be maintained, but we believe that there is an urgent need for the substantial development of post-graduate work in Australia, of a quality sufficient not only to provide adequate training for Australians, but also to attract overseas students. A few Asian students have already come to Australia for advanced work in statistics and there seems little doubt that a strong post-graduate mathematical school in Australia could attract first-class students from the Asian countries.

The mathematics staff

The Australian Mathematical Society lists 94 of its members (about 62 per cent of the total membership) as employed by universities and colleges in Australia (December, 1957); some of these are in Departments of Theoretical Physics or Economic Statistics. The following table gives some idea of the training and background of those members who were on the full-time staff of university mathematics departments in 1957.

TABLE 4. TRAINING OF MATHEMATICS STAFFS

	No. of Staff	No. with Doctorates: Ph.D. and D.Sc.	No. with overseas training	No. of posts temporarily vacant*
Adelaide (Maths.)	7	2	5	1
A.N.U. (Stats.)	3	3	2	1
C.U.C. (Maths.)	2	2	2	1
Melbourne (Maths.) ..	10	6	7	3
(Stats.) ..	3	1	2	2
New England (Maths.) ..	7	2	5	2
N.S.W. Technical (Maths.)	20	2	7	0
Sydney (Maths.)	10	7	9	0
Queensland (Maths.) ..	6	2	4	1
Tasmania (Maths.) ..	5	2	2	1
West Australia (Maths.) ..	6	3	4	2
Total	79	32	49	14

* From advertisements in 1957 and up to February, 1958.

These figures show that over 60 per cent of the staff received their advanced or total training overseas. Further study discloses that about 75 per cent of the staff is of Australian origin, the remaining 25 per cent having been recruited from Europe and Britain. Among these, however, only 9 per cent are from Britain, and most of the other 16 per cent are continental refugees whose migration to Australia should be regarded as exceptional. It is interesting to note that the intake of mathematicians from Britain is exactly balanced by the 7 Australian mathematicians known to be working in British universities. There seems to be an increasing tendency for mathematicians in Australia to migrate to America; this culminated during 1957 in the resignation of 5 academic mathematicians and 1 statistician in the Commonwealth Scientific and Industrial Research Organization who took up new appointments in the U.S.A. and Canada.

This drift has been partially attributed to the unsatisfactory salary position of the Australian universities in the post-war readjustment; but this situation has certainly had its counterpart in Britain and America. When the recommendations of the Murray Committee on salaries are fully implemented, Australia should be in a better position to compete for mathematical talent. The comparative picture is broadly indicated by Table 5 below; the British figures are those following the adjustment of August, 1957, the Australian figures follow the recommendations of the Murray Committee, and the figures for the United States are obtained from a 1957 survey[8].

TABLE 5. UNIVERSITY SALARIES IN U.K., U.S.A. AND AUSTRALIA

	Professor	Reader up to	Lecturer I	Lecturer II
Britain*	£stg.2,300+	£stg.2,150	£stg.1,350-1,650	£stg.900-1,350
Australia	Professor £A.3,500 (+500 at A.N.U.)	Reader-Associate Professor £A.2,600-2,800	Senior Lecturer £A.2,100-2,500	Lecturer £A.1,500-2,050
U.S.A. ..	Professor† $6,190-14,450 $9,323(average)	Associate Professor $5,230-8,260 $6,750 (average)	Assistant Professor $4,760-5,720 $5,263 (average)	Instructor $3,820-4,721 $4,359(average)

* £A1 = £stg. 0·8 = $2·23.

† The salaries in the U.S.A. indicate possible ranges of payment, not incremental ranges as for Britain and Australia.

We believe that salaries are not the chief factor in attracting mathematicians away from Australia. Of more importance is the considerably higher level of mathematical activity in Europe and America, and the ease with which stimulating mathematical contacts can be maintained. Formal teaching commitments, at least in Britain, are usually lighter; in addition the Australian Public Examination system imposes a heavy load on university departments, some of whose staff members spend a good part of their summer setting and marking Junior, Senior, Leaving and Matriculation examination papers. In order to prevent a serious drift of mathematicians away from Australia we will need adequate salaries, improved opportunities for personal mathematical contacts both within Australia and abroad, and a significantly higher level of staffing to permit more freedom for research. The projected development of a strong post-graduate school at the Australian National University could be of considerable value in this regard.

The research activities of academic mathematicians in Australia[9] compare favourably with those of mathematicians in America. Table 6 gives an analysis of the rates of publication for mathematicians in these two countries; although the number of papers published is not an accurate measure of the depth or importance of research, it is at least an index of the interest taken by a worker in the development of his chosen field of study. The figures quoted for America are a simplified version of those given by the National Science Foundation for 1,851 Ph.D's. who graduated between 1915 and 1954; the ratio $r = p/y$ is the annual publication rate, where p is the number of papers published, and y is the number of years between the award

of a Ph.D. and 1955. In the case of Australia, p indicates the papers published, but y is now the number of years between the date of the first paper and 1957. The rates are thus not strictly comparable, and should be viewed with some reservation, particularly for so small a sample.

TABLE 6. PUBLICATION BY MATHEMATICIANS IN U.S. AND AUSTRALIA

Rate of Publication	America		Australia	
	No.	%	No.	%
Very High : $r > 1$	263	14·2	18	22·9
High : $1 \geqslant r \geqslant 0{\cdot}3$	580	31·3	15	18·9
Moderate : $0{\cdot}3 > r, 2 \geqslant p$	414	22·4	4	5·1
Low : $1 \geqslant p \geqslant 0$	496	26·8	8	10·1
No response	98	5·3	34	43·0
Total	1,851	100%	79	100%

The interests of Australian mathematicians appear to lie mainly in various branches of applied mathematics. The *Research Register of Australian Mathematicians* and a survey of papers read at conferences over the past few years indicate that mathematical statistics and probability theory, fluid flow, elasticity, numerical analysis (including electronic computing), and mathematical physics are the most popular fields of research. Some mathematicians are also active in sections of pure mathematics such as differential equations, certain branches of algebra, analysis, geometry, number theory and topology. It is difficult to escape the feeling that mathematicians whose interests are not those of the majority must suffer from the lack of communication with fellow workers in their fields; on the other hand, the comparatively large numbers of mathematicians engaged on applied mathematical research, enables at least a few groups among them to be largely self-sustaining, and to develop to some extent independently of centres overseas.

Future needs and the training of mathematicians

The staff-student ratio at Australian universities is considerably lower, on the average, than that in Britain. The ratios for 1957, given in Table 7, are worked out on the basis of weighting part-time staff by $\frac{1}{3}$, part-time students by $\frac{1}{2}$ and external students by $\frac{1}{4}$; at least in

the well-established universities, they are substantially lower than the comparable figure for British universities.

TABLE 7. STAFF: STUDENT RATIOS

University	Staff : Student Ratio
Adelaide	1 : 11·3
A.N.U.	1 : 0·6
C.U.C.	1 : 3·7
Melbourne	1 : 12·6
New England ..	1 : 4·9*
N.S.W. Technical ..	1 : 7·9
Sydney	1 : 11·6
Queensland	1 : 9·0
Tasmania	1 : 7·9
West Australia	1 : 7·9
Britain	1 : 7·0

* It has been pointed out that external students at the University of New England take an average of 1½ courses a year, and internal students 3. On this basis, the staff-student ratio would be 1:6·5.

The Murray Committee has stated in its report that a 60 per cent increase in staff would be needed to bring the level in Australia up to that in Britain.

This appears to be true of the mathematics and statistics departments in the universities. Estimates given by the departments on the number of staff (of the status of lecturer and above) which they will need by 1962, total 92 on the present staff-student ratio, and 130 at a level which they consider adequate. These figures are conservative when taken in conjunction with the findings of the Murray Committee. Estimated total numbers of university students by 1962 and 1967 are given in the Committee's Report as 56,000 and 70,785 respectively; assuming the present level of staffing and a similar proportion of students taking mathematics courses, the total mathematics staff would need to be 121 and 153 within five and ten years respectively. If the Committee's figure of a 60 per cent staff increase to raise the present level in Australia to that of the British universities were taken into account, the staff numbers for 1962 would be 194, and by 1967 they would reach 245. Table 8 below contrasts these estimates.

The recruitment of the additional staff needed in the next few years for the mathematics and statistics departments will undoubtedly be a major problem, particularly when it is remembered that there will be increased competition from industry and Government departments for the limited number of graduates of high quality. It would

TABLE 8. LEVEL OF STAFFING

	Year	At Present Level	At Desirable Level
Actual Staff	1957	79	—
Departmental estimates for total staff	1962	92	130
Estimates for total staff based on the Report of the Murray Committee	1962	121	194
	1967	153	245

appear from recent advertisements that this demand is rising. At present, about 35 per cent of members of the Australian Mathematical Society residing in Australia are employed in non-academic posts; in America, the equivalent figure (from data given by the American Mathematical Society) is about 60 per cent, and is known to be increasing rapidly.

The recruitment problem is not a new one; five university mathematics departments have failed to fill vacancies on first advertisement since 1952,[10] and two departments have repeatedly failed to fill two senior positions each. But the increasing dimension of the problem can be estimated by contrasting the figures of Table 8 with the 10 Ph.D's. in mathematics awarded in Australia during the 1947-56 period. Using the most conservative estimates based on the Murray Report, and assuming—most optimistically—the recruitment of 25 per cent of new staff from mathematicians fully trained overseas, approximately 60 new staff will need to be recruited by 1967 from persons fully trained in Australia, and from Australians partially trained overseas. If the recommendations of the Murray Report requiring substantial improvement in the staffing level are to be fully implemented, this figure will certainly need to be doubled. In view of the shortages of mathematicians already existing in other English-speaking countries, it is probably more realistic to assume that future recruitment of non-Australians will be cancelled by the drift of Australians to overseas posts. In the absence of substantial increases in the opportunities available to Australians for post-graduate study overseas, we estimate that at least 250 students will need to receive advanced mathematical training in Australia in order to supply the anticipated market during the next decade. Taking into account past performance in post-graduate training and the present numbers of honours students, there is virtually no chance that this will happen.

One is forced to the conclusion that an impasse has been reached. Only a completely radical and vigorous approach can succeed if

mathematics in Australia is not to be faced with a prolonged crisis, and the eventual disintegration of its present standards of teaching and research.

Some recent developments

The current shortage of mathematicians is of course only one facet of the general shortage of scientists and technologists facing the Western democracies. Although recent events have accentuated it, the problem has been recognized for a number of years in Britain and the U.S.A., and considerable effort has been put forward by Governments, universities and private organizations towards its solution. In Australia the position would almost certainly be worse now if post-war university education had not been stimulated by the Commonwealth Scholarship scheme; if current proposals for the creation of post-graduate Commonwealth scholarships are agreed to, this will mark a further significant advance. Moreover, the recent acceptance by the Commonwealth Government of the recommendations of the Murray Committee gives hope for considerable improvement in the financial position of the universities.

The Commonwealth Government, partly to reduce the loss of Australian academic talent to centres of scholarship overseas, and partly to create advanced schools of research in the medical, physical and social sciences as well as in Pacific studies, founded the Australian National University in 1946, and has since entirely supported it. The creation of this institution was an act of imaginative statesmanship; the University has not only succeeded in bringing back to Australia many distinguished Australian scholars and scientists abroad, but has also drawn heavily on British and foreign talent (45 per cent of the staff of 114; June, 1957). The studentships for post-graduate study have proved as attractive to foreign as to Australian graduates; these two groups have constituted the student body in almost equal numbers (37 : 39 in 1955; 34 : 35 in 1956). There exists at the moment an active department of statistics in the A.N.U., but no department of mathematics; there is, however, a plan for the eventual foundation of such a department within the school of physical sciences. The past record of the University gives every reason for believing that this department would develop into a lively centre of research, and prove attractive as a post-graduate school of mathematics to both foreign and Australian graduates.

For scientists, the foundation in February, 1954 of the Australian

Academy of Science, marks an important advance. The Academy has already had some influence in shaping the development of science in Australia, including that of the mathematical sciences. In its survey, *Scientific and Technological Manpower: Supply and Demand in Australia* (1957) the Academy drew attention to the serious shortage of science and mathematics teachers, the small numbers of Ph.D. graduates in science, the drift of Australian scientists to Britain and the U.S.A., and the small attraction which posts in Australia hold for British and Continental scientists. These are the problems which the present article has outlined more specifically for mathematics, and to which solutions have yet to be found. The Academy has recommended that the Commonwealth Government set up a Committee of Inquiry on Science and Technology to examine, *inter alia*, the teaching of science and mathematics in schools, and a special migration scheme for scientists and engineers. Meanwhile, efforts are to be made to attract more qualified graduates into teaching careers in science and mathematics, to increase enrolments in science faculties by some 50 per cent, to reduce university failure rates, and to treble the number of Ph.D. students in the sciences. It is to be hoped that these objectives will achieve some measure of success.

Lastly, the outlook for mathematicians in Australia has improved considerably since the foundation of the Australian Mathematical Society in August, 1956. The Society has made Australian mathematicians more conscious of themselves as a professional group, with serious national responsibilities. For many years past, the bulk of the research work of Australian mathematicians has been published in Britain and the U.S.A.; the issue of a new journal, shortly to be published by the Society, should do something to relieve the difficulties of securing publication in foreign journals. In addition, it should stimulate further research, attract the attention of foreign mathematicians, and contribute to the liveliness of mathematical thought in Australia. The annual conferences of the Society in 1956 and 1957 were well attended, and gave rise to numerous papers (37 in 1957), many of them of a high standard. Before the formation of the Society, mathematicians were organized only as a subsection of A.N.Z.A.A.S.,* and meetings were singularly lacking in mathematical vigour. It would be no great exaggeration to suggest that Australian mathematicians look to the Society for leadership in the formulation of plans for attacking the current problems.

* Australian and New Zealand Association for the Advancement of Science.

Some further suggestions

One point which has been brought home to the academic profession in Australia by the Report of the Murray Committee is the necessity for overall national planning in the development of universities, their faculties and departments. When the projected Australian Universities Commission begins to function, financial and other plans will probably be made for three yearly periods. It would seem as if academic planning in Australia in response to national needs has so far occurred in a rather sporadic and haphazard manner. But the complex problems of a country whose population has increased from 7½ millions in 1945 to nearly 10 millions in 1958, and whose economic and industrial expansion have followed apace (see [11]), can no longer be met by a series of uncoordinated extemporizations. This is particularly true in the field of scientific training and development, and especially in mathematics, the central discipline of the sciences.

We have mentioned some of the outstanding problems. We have also outlined some of the more hopeful recent advances towards a solution of these problems. We would finally like to put forward some further suggestions of our own; these are not intended as dogmatic pronouncements, but rather as tentative points of view to be judged on their practical merits and used as a basis for discussion by those interested in resolving the difficulties of the present situation.

Improvement in the teaching of mathematics in the schools is a complex problem. Curricula tend to become fixed and to bear little relation to modern mathematics; teachers lose contact with more advanced mathematics, and their interest in modern developments declines rapidly; many students develop early attitudes towards mathematics which make its learning and understanding almost impossible. The curriculum problem is, in theory, the easiest to solve, but teachers must be convinced of the need for changes if they are to teach new material properly; this is related to the second problem, that of retaining the interest of teachers in their subject. In New South Wales, Queensland and Victoria there are branches of the Mathematical Association of Great Britain, but in the remaining States there is no organization of mathematics teachers. The *Australian Mathematics Teacher*, published in Sydney, is not widely circulated, and indeed many teachers seem to be completely ignorant of the existence of this and other journals which are largely devoted to the stimulation of the teaching of mathematics.[12] While university mathe-

matics staffs can and should assist in teachers' organizations, these will function best when motivated by the enthusiasm of the teachers themselves. A beginning has been made in some States where summer 'refresher courses' have been organized; we would propose the extension of these. Another possibility would be the seconding of school teachers to university mathematics departments for longer periods; this would enable them to further their own mathematical development, and should provide them with the same sort of intellectual stimulus and re-invigoration that University lecturers obtain from periods of sabbatical leave. During such periods teachers could also give some tutorial assistance in the large first-year university classes.

We mentioned earlier a further problem in the schools: the serious lack of information on mathematics, its social function, and the many opportunities it offers as a career. We feel that to provide this information, staff in the mathematics departments of the universities should co-operate with the schools in organizing series of popular talks to schoolchildren. Not only could these serve to maintain the interest of teachers and their pupils in mathematics, but they would also allow the dissemination of accurate knowledge about mathematicians and their work among future university students.

In the rapid expansion of teaching facilities which the schools and universities must achieve in order to handle the rapidly rising numbers of students, there is a real danger of deteriorating standards. In this connection, the activities of the National Science Foundation set up in 1950 in the U.S.A. are certainly worthy of study. The Summer Institutes, Academic Year Institutes for high school and college teachers, and scholarship programmes sponsored by the Foundation, have enormously stimulated the maintenance, and the very necessary raising of standards at all levels of the teaching profession. We would propose the establishment in Australia of a similar Foundation; as in the U.S.A., the Academy of Science could help in an advisory capacity.

The problem of staff recruitment is not likely to be easily solved. An increasing proportion of staff will need to be recruited in Australia. If, as we would hope, the Ph.D. degree continues to be regarded as a desirable qualification for a lecturer, it is obvious that there is an immediate need for the development in Australia of a strong post-graduate school of mathematics. It would be undesirable, and probably impossible, to attempt to establish more than one strong post-graduate school at the present time. Concerning this, Professor

Marshall Stone of the University of Chicago, Past-President of the International Mathematical Union, said in his address to the International Conference on Mathematical Education held in Bombay, 1956:

> One practical point needs to be appreciated in the consideration of post-graduate mathematical instruction—namely, that under normal circumstances there can be only a limited number of University centres, even in a very large region like Western Europe or the United States, at which a fully developed post-graduate curriculum and research programme can be offered. Accordingly it becomes important in guiding the development of the University system to decide where such centres should be created and where post-graduate instruction in mathematics should be limited to less ambitious goals.

The creation of such a mathematical centre in an Australian University need not, however, entail a complete monopoly of post-graduate work; other universities should certainly continue to train post-graduate students in those particular fields in which their staff are specialized.

The proposal for the establishment of a department of mathematics at the Australian National University seems to us to be extremely sound.[13] Besides complementing the existing developments there in theoretical physics and statistics, and contributing to the solution of the staff recruitment problem, such a department could become a focal point of national mathematical activity rather like Cambridge in England, Princeton in the United States, and Paris in France. It might eventually sponsor, jointly with the Australian Mathematical Society, an annual Summer Research Institute in Canberra along the lines of the one so successfully run at Queen's University, Kingston, Ontario, by the Canadian Mathematical Congress. This project has recently been approved by the Society, and may be implemented in the near future.

NOTES

We wish to express our thanks to all members of Departments of Mathematics and Statistics in the Australian Universities for their whole-hearted co-operation in supplying factual information, for their helpful suggestions, and for criticisms of an earlier draft of the article; some of these have been incorporated in our final copy. J. Gani worked on this article at the Australian National University; his thanks are due to the University for the use of its library, and of its other facilities.

[1] (a) *The Place of the Australian University in the Community, and Post-Graduate Studies in Australian Universities: a Symposium.* Australian Vice-Chancellor's Committee, Australian National University, 1955.

(b) *Scientific and Technological Manpower: Supply and Demand in Australia.* Australian Academy of Science, Canberra, 1957.

(c) 'The training of statisticians in Universities,' by J. Gani, *Gazette of the University of Western Australia*, 1957.

(d) *University Enrolments in Australia, 1955-1970: a Projection*, by W. D. Borrie and R. M. Dedman. A.N.U. Social Science Monograph No. 10, 1957.

[2] 'Mathematics and the future of science,' by M. H. Stone. *Bulletin Amer. Math. Soc.*, 1957, Volume 63, No. 2, 61-76.

[3] This was established originally in 1938 as the New England University College, a branch of the University of Sydney.

[4] Failure rates among mathematics students in Australian Universities are not known in any detail; in Western Australia over a period of 5 years 35·7 per cent of all entrants for first, second and third-year Pure Mathematics examinations failed. The average percentage of all students failing to complete their degree courses is available however, and is estimated at 42·3 per cent, as against 17 per cent in the U.K. (see [11]).

[5] Students in first-year in 1955, second-year in 1956 and third-year in 1957 numbered 196, 92, 26, respectively.

[6] From a questionnaire circulated to Departments in the Universities.

[7] *A Survey of Training and Research in Applied Mathematics in the United States.* Society for Industrial and Applied Mathematics, Monograph No. 1, Philadelphia, 1956.

[8] *A Survey of Research Potential and Training in the Mathematical Sciences.* National Science Foundation, U. of Chicago, 1957.

[9] Figures from *A Research Register of Australian Mathematicians*, compiled and edited by P. Sprent for the Australian Mathematical Society (July, 1957).

[10] The Division of Mathematical Statistics, C.S.I.R.O., has had similar difficulties.

[11] Report of the Committee on Australian Universities, Canberra, 1957.

[12] E.g. The Mathematical Gazette; The American Mathematical Monthly; Mathematics Magazine; The Year Book of the National Council of Teachers of Mathematics (U.S.A.); School Science and Mathematics.

[13] Agreement on this proposal is by no means universal; the interesting counter-suggestion was made that research Chairs in mathematics, whose holders would be totally free from administrative and teaching duties, should be founded in each of the universities. It is also felt in some quarters that the A.N.U. department of mathematics could be a success only if supported by strong departments in the other universities.

ON WORDSWORTH'S 'MICHAEL'

J. L. BROWN[1]

I HAVE not been able to appreciate Wordsworth's pastoral poem *Michael* as I ought to have done and it seems perhaps worth while to tidy up what I think about the poem, and so to make plain to myself what is wrong with my approach, criticizing myself by appearing to criticize the poem.

I think my chief difficulty lies in Wordsworth's view of endurance. He admires the elemental figure standing there, very likely with some mists swirling nearby, and just absorbing the blows of fate. There is of course no doubt at all that sometimes this is all that there is to do, and that the absorption of the blows and the continuing to hang on, is a magnificent and tragic spectacle. It is particularly impressive when the reason for the hanging on has ended, when there is no advantage to be gained from it, and the endurance simply arises from habit and association and attachment to life. This however does not mean that passive endurance is always a virtue—

> Wisdom lies
> In just administration of the unforeseen.

There is a prayer somewhat to this effect—'Lord, give us the courage to change those things which ought to be changed, the strength to bear those things which cannot be changed, and the wisdom to distinguish between them.' It seems to me that Michael's suffering was not unavoidable and that he could have done more to prevent it.

One of the reasons that I am liable to over-insist on points like this is that I lived for years amongst Gaelic-speaking people in Scotland. There everything is suffered and not done—the form of the language allows this and it convinces everybody. You say 'It happened to me that I got drunk', or if you have broken somebody's valuable ornament you say 'It happened to me that I dropped it'. You then expect sympathy as a victim of fate. It has happened to me that I have bored many people on this subject.

Again Michael seems to me to be quite a modern figure and I expect him to know and to be able to do the things that a man in his

position would know and could do today. This is possibly due to the fact that I know the Wordsworth country a little, and so much of it is little changed since Wordsworth's day that I have some difficulty in realizing that though the landscape of the poem may be the same now as then, other surrounding circumstances have changed greatly. *Michael* after all was written in 1800. Where I see a straining of the facts, it may be due to my lack of appreciation that the facts are different.

A further difficulty lies in the language and metre used. The use of conversational miltonic is fraught with danger from lapses on the one hand into the excessively conversational and on the other into the inappropriately sublime. In this poem it seems to me that Wordsworth strays somewhat from the narrow line—for example in the description of the lamp,

> an aged utensil, which had performed
> Service beyond all others of its kind,

and earlier in the poem in the description of the spinning wheels,

> two wheels she had
> Of antique form; this large, for spinning wool;
> That small, for flax; and if one wheel had rest,
> It was because the other was at work.

In general it does seem that the line is often rather cumbersome for the load it carries. It seems to me to be rather strained at times, and to lack the masterly ease of parts of *The Prelude*.

I am told that it is a mark of all bad criticism to seize on the matter of a poem rather than on its form. However since Johnson considered the matter of *Lycidas* and found it obscure and remote, and since Arnold criticized Shelley's want of sound subject matter, perhaps I may on this occasion follow their bad example. It is in any case the subject matter which comes between me and enjoyment of the poem.

I think I should not have had difficulty if Luke had been left out of the poem altogether, though this would have affected what drama the story has. The story would then have been that of an old but vigorous man of eighty-four being called upon to pay a large amount of money in respect of a suretyship he had rather unwisely taken on. He took the risk of loss, and he has lost, and he has to pay. The only course open to him is to sell some land or to raise some money on his land. This is a sad blow, but it has to be borne, and if he bears it bravely this is admirable. 'Courage shall grow stronger as the

strength grows less.' Even here of course the tragedy results from a trap that he might have avoided—it does not develop inevitably from the nature of things.

In fact however Michael has been less wise than this, for he has taken on the risks of suretyship though he has two much younger dependants. He has also the possibility of much better fortune—he thinks that Luke will be able to pay off his debt for him. He sends him to the city for this purpose, so that the sale or mortgaging of land will not be necessary. He knows that there is some risk in sending Luke, but he takes the risk. This gamble does not succeed, so that Michael is in the same position as though he had had no son. Luke however has fared rather badly.

The ages of the persons involved are carefully calculated to help out the story. Any complaint that Michael might have done more, or might have done something to help Luke during his absence in the city, or that Michael's attitude after the flight of Luke is passive, can be explained as due to Michael's age. Luke has to be of an age when he is capable of going to the city alone, and yet also very liable to be led astray, while Isabel's is arranged so that she is as near as possible to Michael's age consistent with bearing Luke.

Part of the difficulty is perhaps that Wordsworth wishes to portray virtue, not triumphant indeed, but enduring. His virtuous cannot suffer because of sin they commit, they cannot suffer at the hand of their fellows because virtuous people are attractive and loved. They have therefore to suffer as a result of what may appear to be simple-mindedness.

It seems to me that the heap of stones which was to have been incorporated in the sheepfold is rather an ambiguous symbol—it is used as a sort of memorial to Michael at the beginning of the poem. The stones are considered as a memorial to Michael's tenacity, whereas of course the fact that they are there at all is a sign that Michael did not finish the sheepfold. By Luke's involvement with them, they are, I think, used as a reproach to Luke without being used as a reproach to Michael for having risked Luke.

In all, I think the events narrated lack the generality and inevitability of tragedy.

I do see that I am missing what Wordsworth meant to be the point of the poem. Michael is a simple but heroic figure, buffeted by fate. First, quite unexpectedly, a favour he has done for a kinsman involves him in heavy loss. In order to make good this loss he sends his

son, the apple of his eye, to the city, but there again misfortune intervenes, for his son falls into evil ways and has to leave the country. Michael absorbs these blows and bowed, but not beaten, carries on without heart, but carries on. Very likely I miss other points but I think this is the principal one he is making. The details however stand out and obscure this picture for me.

I personally find it easier to see this tough attachment to life in animals than in human beings, and this may be chiefly because I do not become aware of their actively thinking minds. In persons the constantly thinking mind is all the time hiding from an observer the tough attachment to life which may be there all the time. This sort of toughness really is a sort of animal quality deeper than the conscious will. Wordsworth finds it largely in the labouring poor of his day, and it may be that the very real calamities which beset them did call up their reserves of toughness. Perhaps however the social distance between Wordsworth and the members of these classes, and their inarticulateness to him, may have meant that he did not see the other qualities, or lack of them, which accompanied the toughness.

It does seem to me that the absence of any weapons, or resources, apart from this attachment to life, is a lamentable poverty. Having tried to get Luke to save the situation unsuccessfully, Michael knew of nothing else to do but retreat. If the attachment to life is regarded as his inner fortress, he retreats to it. I think he should have fought somewhere, for this inner fortress is not worth having as a permanent residence. Even if it is necessary to fall back on it, Michael ought to be looking out perpetually so that he can get into the country where other people live. He is not doing this—the sound of the line 'And never lifted up a single stone' tells us plainly that he will never get out of it.

NOTE

[1] Mr. Brown is an Officer of H.M. Customs and Excise, and he wrote this essay as part of his work in a W.E.A. class in Ipswich which was studying poetry from Donne to Browning. Mr. Brown's tutor, L. G. Salingar, commends it as 'an example of the best kind of work that—in my experience—the member of an adult class can produce: that is, where reading and discussion of an academic type are combined with the direct expression of adult experience'.

UNIVERSITY STANDARDS

R. R. DALE

Lecturer in Education, University College of Swansea

ONE of the biggest obstacles to improvement in the selection of students is the unreliability and uncertainty of university examinations, and the biggest obstacle to reform is the ignorance of the staffs of universities about the pitfalls which surround the examiner. The calm assurance with which lecturers and professors alike believe that they can carry around in their heads an unfailingly correct conception of an absolute standard of forty per cent as the pass line is incomprehensible to anyone who has studied the research on the reliability of examinations. Let me hasten to add that this lack of insight is accompanied by a conscientiousness and an evident desire to do justice that are worthy of the highest praise.

Before examining the evidence on which this criticism rests let us look briefly at the present examination system in the universities. Three connected problems will be discussed: the unreliability of academic examinations, the pass-fail rate, particularly for first-year students, and the variations from department to department and from year to year in the standard of any one degree class. Let us look first at the third part of the problem. Here is a tabulation of honours degree results for a recent year at a provincial university. It is purely by chance that this set of statistics is used; it was not specially selected to prove a case:

TABLE 1. HONOURS DEGREE RESULTS

Faculty	Class I	%	Class IIA	%	Class IIB	%	Class III	%	Total Number
Arts	2	1·4	29	20·3	93	65	19	13·3	143
Commerce	1	2·0	9	18·4	19	38·8	20	40·8	49
Science	29	18·5	68	43·3	46	29·3	14	8·9	157
Applied Science	26	22·8	—	—	—	—	4	3·5	114

Note: The general arts degree results, aegrotats and pass degrees are omitted. The applied science results could not be tabulated on this pattern as in some cases Class II was undivided.

We see from the table that almost one student in every four gaining honours in applied science obtained a First Class degree, almost one in five in pure science, one in fifty in commerce and one in seventy in arts. The other degree classes follow a similar trend. In pure science 43 per cent obtained a IIA degree, but only 18 per cent in commerce and 20 per cent in arts. The outstanding features of the remaining figures are the 65 per cent of students who were awarded a IIB degree in arts, and the 41 per cent in Class III in commerce. The latter figure compares with 13 per cent in arts, 9 per cent in pure science, and 3·5 per cent in applied science. Though it would be naive in the extreme to expect that class percentages should be equal for the different faculties, as the standard of entrants may be different, it would be even more astonishing if these results were a true reflection of the comparative ability of the students. Though the inclusion of Pass graduates in the totals against which the Firsts are percentaged reduces the percentage of Firsts in the science faculty to 14·6 and in applied science to 15·3, while the percentage of Firsts in the arts faculty remains virtually the same at 1·35 and the faculty of commerce at 1·8, the general pattern is little changed. It is interesting to compare the foregoing results with those collected by Valentine[1] from five university institutions in England and Wales mostly over a period of three or four years between 1925 and 1929. Computing on the same basis as the Table, 19·7 per cent of all students gaining honours in arts were awarded Firsts (cf the 1·4 per cent in the Table), while 40·4 per cent gained Firsts in science. If we include Pass degrees in the total the percentage of Firsts in arts drops to 13·7 and that in science to 21·6.

The principal reason for this wide variation in degree standards from one faculty to another lies in the nature of the subject matter. It is well known that mathematics and those subjects in which the mathematical content is high yield a much greater spread of marks than subjects such as English and history in which the essay type of answer predominates. In between these come the classical and foreign languages, where part of the subject has some resemblance to mathematics for marking purposes while part of it resembles English and history. Unless there is conscious correction on the part of university examiners it follows that—other things being equal—most Firsts will be awarded in 'mathematical subjects', including science, next will come classics and foreign languages, and history and English, in that order will bring up the rear. In practice we frequently get almost

precisely this happening, as in Table 1. The operation of other forces, such as an unusually selective entry to a department or an exceptionally harsh attitude by an examining board may blur this pattern, but it can be seen quite clearly in Table 2 for men, and partially for women.

TABLE 2.* PERCENTAGES OF FIRSTS GAINED BY MEN AND WOMEN STATE SCHOLARS IN DIFFERENT SUBJECTS

(The number of students taking a given subject is put in brackets)

Men			Women		
Engineering	(30)	70%	Modern Languages	(123)	40%
Mathematics	(89)	59%	Classics	(26)	38%
Natural Sciences	(162)	59%	Natural Sciences	(33)	36%
Modern Languages	(37)	57%	Mathematics	(41)	29%
Classics	(57)	39%	English	(120)	21%
History	(40)	35%	History	(92)	17%
English	(14)	21%			

* Thanks are due to Professor Valentine for permission to reproduce this table (op. cit. p. 124).
See also the Report of the Board of Education for 1930, p. 64.

For our purpose the men's table is the more reliable, as the performance of women at the university tends to fade in comparison with that of men, and this fading may well be rather greater in mathematical subjects where the necessary special abilities are less marked in this sex, than in languages where the relevant special abilities are well in evidence. In the men's table it will be seen that the mathematical subjects have the greater proportion of Firsts, modern and classical languages come next, while history and English have a smaller proportion. With the women also, the essay subjects history and English take the last two places.

Even at Oxford, where additional cross-currents are at work, the same trend is to be seen, though it must be emphasized that these results should be considered in relation to the two already given. Worswick's analysis of the 1956 degree results[2] shows that, of the larger schools, chemistry had the largest proportion of Firsts at 15·4 (engineering had 17·5 per cent with only 57 students), Greats were next with 14·2 followed closely by mathematics 12·0, with physics 9·2. Of the 'essay' subjects P.P.E. had 7·2 per cent, English 6·6 per cent, modern history 5·7, theology 3·1, and geography 3·0. Surprisingly modern languages had only 3·8 per cent, but this is the only major exception; it may be that this is because modern languages at Oxford have not as high a prestige as have some other departments, but we have no evidence by which the situation might be assessed.

The 1954 results at Oxford[3] happen to be at hand, and are very similar in pattern, with natural science leading the list with 13 per cent of Firsts, Greats following with 12 per cent, and mathematics third with 11 per cent; P.P.E. had 7 per cent, English and history 6 per cent, and geography 1 per cent. Once again modern languages with 3 per cent did not follow the usual trend.

Finally, here are the results for three recent years (selected by chance) of a third university institution:

TABLE 3. PERCENTAGE OF HONOURS GRADUATES AWARDED A FIRST CLASS DEGREE

	No. of Hons. Graduates	Percentage Firsts
Mathematics	11	45·5
Chemistry	44	29·5
Modern and Classical Languages	35	28·6
Physics	34	23·5
English, History, Economics, Philosophy	86	2·3

Here the numbers of students are small so that too much stress must not be placed on the exact order of merit. But again, the mathematical and language subjects are away at the top while the proportion of Firsts in the 'essay' type subjects is absurdly low by comparison. The factor outlined above is not, of course, the *only* force at work. For example, these figures might be affected by variations in policy between departments regarding admission to Honours schools. This was checked, for faculties, by including Pass degrees in the totals against which the Firsts were percentaged, yielding 6 per cent of Firsts for arts and 13 per cent for pure science and applied science, indicating that the faculty differences were not due merely to such variations in policy.

It seems, then, that the principal reason why a much larger proportion of First are awarded in mathematical type subjects than in 'essay type' subjects may well lie in the nature of the material, which produces a greater range of marks. Are the universities satisfied that this factor should operate unchecked? It is time that the universities examined this problem and attempted to secure a rough approximation to equity between departments and between faculties. Any attempt to force departments or faculties to award the same percentage of Firsts, even if calculated on say a five-year period, might

cause almost as much inequity as the present system, but much will be achieved if departments and faculties become aware of the problem and consult together to reduce the greatest anomalies.

There remains for consideration the fluctuation of the degree standard from year to year within any one department. As this is more likely to occur in first-year examinations it will be dealt with in the next section. Here it will only be pointed out that an Honours candidate is protected somewhat against a marked fluctuation in the standard of the papers by the number of papers he takes, provided that compensation is allowed from one paper to another. Similarly the number of the markers protects him against a change in the standard of marking, and against any unreliability of marking, provided that comparability of standard is achieved in the marking of optional papers. Perhaps the most likely fluctuation would be due to a change in the head of department and the external examiner. The 'climate of opinion' in the examining board can in this way experience a decided alteration, affecting the class of degree awarded.

In an earlier publication[4] the writer put forward evidence which pointed towards a fluctuation in the pass standard of the first year examinations in one university institution. Comparing the scholarship-holders of two successive years, A and B, it was found that they appeared similar in intelligence (not all were available for testing), and in spite of group A having a better academic standard on entry and securing better degrees, they had an appreciably greater number of failures in first-year examinations. As there were only 53 students in each group, and the finding was only a by-product of another enquiry, the above evidence was not regarded as conclusive. Since, then, however, Hohne, in research at the University of Melbourne, has provided data[5] which is more convincing because of the larger numbers involved and because he made a deliberate investigation of this fluctuation. He concludes 'that failure rates did not vary concomitantly with improved student quality, i.e. that university examiners preferred to pass and fail almost identical proportions of students year after year rather than ascertaining (*sic*) the true calibre of their students and adjusting their fail rates accordingly'. He continues, 'Only the assumption that there were fixed, deeply engrained, departmental pass policies seemed to offer an explanation for the otherwise puzzling university failure of large numbers of demonstrably better prepared students'. Though this is substantially true it would be fairer to university examiners to say that usually they do

not deliberately exercise the above preference; rather do they sometimes adjust their standard of marking, according to the quality of the student group, and on other occasions change the standard of the question paper. In both cases they are almost always unaware of what they are doing.

The above discussion must be assessed in relation to the basic research evidence on examining, because from that basis we should expect such a state of affairs as we have described. The research findings on university examining are also in agreement with a vast number of researches on marking in general.

Let us first consider the marking of essay-type answers. Hartog and Rhodes used in a planned experiment the answer papers of some eighteen students in a university history honours examination.[6] These were *not* border-line scripts, but were all the scripts (except 3 destroyed) written in answer to four papers, i.e. 69 scripts in all. Paper I was marked independently by five university examiners of the highest standing, and papers II, III and IV by ten similar examiners. Out of a possible range of 23 grades, the *average* difference between the marks awarded by different examiners to the same script was at least eight grades or a whole class. This reckoning left out of account the most discrepant marker. Naturally the ranges for some scripts were much greater; one had a range of 18, another of 17, three of 16 and one of 15. The scripts would probably be marked at a more leisurely pace than that necessary for university examinations. That any member of a university staff marking these essay-type answer papers, in any subject, should claim to be able to mark to an exact and unalterable standard of forty per cent, from year to year, is mere wishful thinking. There is more than a touch of the ironical in a situation where university staff, often research leaders in their own field, either ignore or are ignorant of research which directly affects their own work.

The work of Hartog and Rhodes showed also that the marking of mathematical type answers, though much more reliable than the above, is not quite as dependable as is commonly supposed.[7] They asked six experienced examiners to mark 23 scripts of university degree standard. The average range of marks awarded for the individual scripts was 34·7 out of a maximum of 300, the lowest range being 16 and the highest 64. On the other hand, though there was a difference of eight places in the ranking of one candidate, the usual difference was only about four places. The statistical analysis showed

that any candidate within 25 marks from the borderline of a class should be reconsidered, where the maximum mark is 300.

But it is probable that the greatest dangers inherent in examining in mathematical subjects are the variability of performance of the candidate and a change in the standard of the paper.[8] As there appears to be little or no research work specifically on these points we have to be content with various 'pointers'. During a perusal of the marks of university students in successive examinations in various subjects it was noticed that while the variation of an individual's mark was quite small in most other subjects, in mathematics it was often considerable. The marks of four candidates who failed in the June examination in mathematics and were allowed to sit again in September are selected as an example.

Candidate	*June*	*September*
A	27 per cent	58 per cent
B	25 „	63 „
C	32 „	59 „
D	36 „	76 „

Another candidate scored, in successive examinations at the same level, 35 Fail (Terminal), 33 Fail (June), 84 Class I (Terminal), Fail (June), 66 (Terminal), Pass (June). Such fluctuations in either the level of the paper or the quality of the performance, or perhaps in both, would be virtually impossible in an essay-type examination, and, at the least, extremely unlikely in a foreign or classical language examination.

A research finding reported by Crawford and Burnham lends some support to this theory; stability correlations for freshmen tested in 1939 and at school in 1937 were 0·82 for verbal comprehension but only 0·56 for mathematical ingenuity.[9] McIntosh, in the 11 plus examination, found that of five tests the ordinary type arithmetic test was lowest in order of re-test reliability. These results are in line with what one would expect from an a priori consideration of the nature of mathematical examinations. In the first place, whereas it is easy in essay type examinations to adjust the standard during the marking, this is more difficult in mathematical subjects; though it is possible to scale the marks up or down afterwards, this is a procedure which many examiners would be reluctant to adopt. In the second place, it is possible in mathematics for a slight 'chance' error to have a pronounced effect on the quality of a script. The effect of this 'chance' error will vary according to its place in the calculation; if at the end

it may have little effect, but if at the beginning it may result in long and fruitless calculation, with psychological repercussions on the quality of the remaining answers.[10]

This article is an expression of the uneasiness felt by those members of university staffs who are in touch with the research findings on examinations. It would be incomplete without some reference to constructive proposals, though these must necessarily be brief. The paramount need is that members of university staffs should be keenly alive to the dangers inherent in their examinations. The writer has suggested elsewhere that newly appointed members of university staffs should be required to attend a summer vacation course in lecturing; to such a course might well be added lectures and seminars on examining—and possibly student selection. Faculty differences in policy in the award of first-class degrees, etc., should be debated by faculties and considered by joint committees. Senates might direct the preparation of a sheet of 'Suggestions to Examining Boards', to be issued annually to each department; this could profitably include not only advice on the more technical dangers, but stimulation to the odd slack department to institute or overhaul its machinery for checking against clerical errors. A comment is added about external examiners. These cannot do their important work effectively if they examine more than one large Department in addition to their own. If professors are in short supply for the task then other experienced members of staff should be called upon. Nor should the reading of research theses be automatically added to the load; these should be sent to those professors and lecturers known to be expert in the field of the research.

The most important, and most revolutionary, suggestion is that a number of the difficulties of examining could be minimized by a judicious incorporation of objective tests into the present system, especially if a number of parallel versions were prepared. They are, of course, used in the eleven plus examination and in the United States have been widely used for many years. at the University level. Their main features are that they ask a large number of questions requiring very short answers, which (in their simplest form) are either right or wrong. Because of the objective marking and the reliability of the performance they could be used to check any gross fluctuation in the standard of the normal papers, or in the standard of the marking from year to year, and in the case of most departments they might even be used to make degree standards more equivalent from

one university to another. They could also be used to keep a watch on any change in the quality of students.

The usual objection made to these tests is that 'they test only the memory'. This is rather a naive objection, as, first, items are frequently included which test reasoning power as well, second, the normal examination questions cannot be attempted satisfactorily unless the principal facts are known, third, as it is suggested that these tests should form only a small part of the examination the normal type of questions would remain to test any qualities which were not tested by the objective tests. In the United States the introduction of these tests was violently opposed by the more conservative sections of academic opinion, but the very people who opposed them soon found them indispensable.[11] The proof of the pudding is in the eating. Crawford and Burnham, commenting particularly on the Graduate Record Examination, found: (a) high individual reliability, even at advanced levels, (b) validity equal . . . to traditional academic records of scholastic performances based on much longer observation . . . and (c) that a combination of the old academic with the new objective tests give a maximum prognosis of success in graduate study.

Though objective tests at the university level would help to maintain a reasonably steady standard from year to year, and even from university to university, in any one department, they would be only of indirect value for producing greater equity between departments and between faculties. Of more value here would be a referring back, by a joint committee of faculties in each university, to the standard attained by accepted students at the Advanced level of the General Certificate. This would yield a not too rough estimation of the average quality of the students who entered each department; for small departments the estimate would be based on the entry for several years. These statistics would not be for individual prognosis, but would enable departments to compare the quality of their students. The conception is based on the theory that, given sufficiently large numbers, the quality of students taking each subject at the Advanced level will be roughly the same. This is a supposition on which examination boards broadly base their pass level. It could be checked by psychological tests and allowance could then be made if any large difference were discovered. Though this is not as simple as it sounds, owing to the different abilities needed for high attainment in various subjects, it would give a sufficient approximation for the purpose in hand.

Even if the giving of the psychological tests were considered to be impracticable the reference back to the Advanced level results would still enable the joint committee to improve on the crude inequalities of the present degree awards. We can say this with some confidence, because these inequalities are so great, and because evidence from the psychological testing of students, though slight, has given no hint of large faculty or departmental differences in ability corresponding in pattern to the differences in degree awards outlined earlier in this article. Though far from perfect the reform is proposed as a *pis aller*.

NOTES

1 C. W. Valentine, *The Reliability of Examinations*, p. 115.

2 G. O. Worswick, *Times Educational Supplement*, February 3rd, 1956.

3 *Times Educational Supplement*, September 1954 (Correspondence).

4 R. R. Dale, *From School to University*, International Library of Sociology and Social Reconstruction, 1954.

5 H. H. Hohne, *Success and Failure in Scientific Faculties of the University of Melbourne*, Australian Council for Educational Research, Melbourne, 1955.

6 P. Hartog and E. C. Rhodes, *The Marks of Examiners*, London, 1936.

7 Ibid. pp. 148-151 and 234-9.
See also Commission Française pour l'Enquête Carnegie. *Atlas de l'enseignment en France*. Paris à la Maison du Livre, *c* 1935.

8 For a fuller account see R. R. Dale, *From School to University*, London, 1954.

9 A. B. Crawford and P. Burnham, *Forecasting College Achievement*, New Haven, 1946. See also C. R. Brolyer, *General Report on the Scholastic Aptitude Test*, New York, 1931-5.

10 Cf. B. C. Wallis, *The Technique of Examining Children*, London, 1927.

11 Cf. The admirable statement by I. L. Kandel, 'Examinations and their substitutes in the United States', Carnegie Foundation for the Advancement of Teaching, Bulletin 28, New York, 1936.

THE VENN DIAGRAMS

T. H. QUALTER

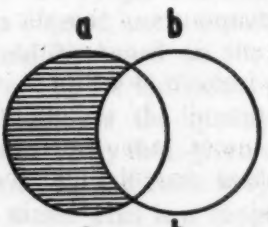
The Venn diagrams were introduced in 1894 by J. Venn to illustrate in simple pictorial form the relationships between the logical classes. They were designed simply as a teaching aid, especially useful for those still uncertain as to what logic was all about, and of considerable assistance to a lecturer trying to talk about 'no a's being b's' and so on.

Here it is suggested that while Venn's scheme was a praiseworthy one, his diagrams, as they are usually presented, are not as clear as they could be. For beginners there are a number of difficulties which do not seem to trouble teachers or experienced logicians, but which are decidedly confusing to a student being introduced to logic for the first time. Since Venn's day generations of students have puzzled to connect the diagrams with the relationships they are intended to symbolize, sometimes finding this connection more elusive than the understanding of the classes.

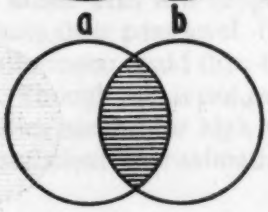
I have therefore redrafted the diagrams, presenting them in a form which I feel is a truer representation of the class relationships they depict.

In their traditional form the basic relationships are drawn as follows:

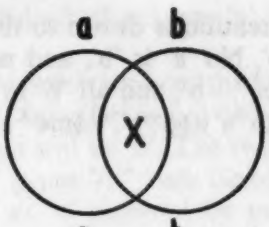
All 'a' is 'b'. $a-b = 0$.



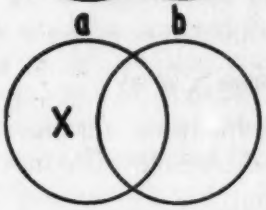
No 'a' is 'b'. $ab = 0$.



Some 'a' is 'b'. $ab \neq 0$.



Some 'a' is not 'b'. $a-b \neq 0$.

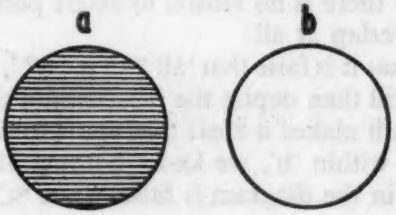


These four relationships, I suggest, could be more clearly represented as set out below. The guiding principles here are that the proposition being considered is the section to be shaded, and that doubtful information is to be enclosed in a broken line. I will consider each of the four basic propositions separately to show how the various propositions demonstrated by the square of oppositions and the various immediate inferences can all be illustrated by these redesigned symbols.

All 'a' is 'b'.

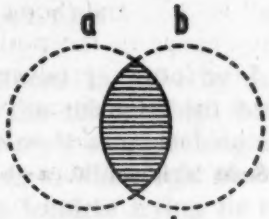
The advantages of this diagram over the old one should at once be apparent. It demonstrates beyond doubt that 'a' is contained entirely within 'b'; that there is no 'a' that is not 'b'; that some, but possibly not all, 'b' is contained in 'a'. Here, unlike the original diagram, attention is drawn to 'a' that has an existence within a 'b' of uncertain extent, and not to the non-existence of an 'a' outside 'b'.

No 'a' is 'b'.

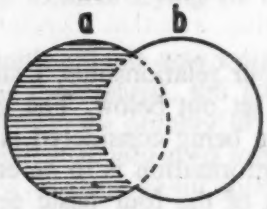


Here attention is drawn to the complete separation of the classes 'a' and 'b'. No 'a' is 'b', and no 'b' is 'a'. All 'a' is to be found in the class of ' – b', and all 'b' in the class of ' – a'. There is nothing that is both 'a' and 'b'. Some ' – b' is 'a', and some ' – a' is 'b'.

Some 'a' is 'b'.



Some 'a' is not 'b'.



It will be noted immediately that the diagrams now suggested for the particular propositions are identical with those originally used by Venn for the universals. This is because attention is now concentrated on the part talked about and not on the part excluded.

With the proposition 'Some "a" is "b" ' there is no doubt that there is some overlapping of the two classes, but as the exact boundaries of the rest of 'a' and 'b' are broken, it is impossible to make absolute statements about either. There is some 'a' that is 'b', and some 'b' that is 'a', but statements about all 'a' or all 'b' are doubtful.

With regard to the particular negative proposition, the only definite information given is that there is some 'a' outside the bounds of 'b' and therefore in the class of ' – b'. There is thus some ' – b' that is 'a', and it can be seen that the class of ' – b' does not consist entirely of the class of 'a'. Some ' – b' is not ' – a'. The diagram shows that there is no reason to assert positively whether or not 'a' and 'b' overlap at all.

Given that it is false that 'all "a" is "b" ', the shaded portion of the diagram will then depict the information that is known to be false. The diagram makes it clear that apart from the fact that it does not lie wholly within 'b', we know nothing about 'a'. As the position illustrated in the diagram is false, some 'a' must lie outside 'b', and

some 'b' outside 'a', but it is doubtful whether some 'a' is still 'b', or whether no 'a' is 'b'.

From here it is a simple step to demonstrate how the falseness of 'All "a" is "b" ' leads to the truth of 'Some "a" is not "b" ', with the doubtful provision that some 'a' might still be 'b'. The two diagrams for 'All "a" is "b" ' and 'Some "a" is not "b" ' are clearly related, in that any change in the position of 'a' required by positing the falseness of the former, produces the situation depicted in the latter.

Given that the proposition 'No "a" is "b" ' is false, it can be seen how from this fact we can deduce only that 'a' does not lie wholly outside 'b'. We cannot make any statement about whether it lies wholly or only partly within 'b'. We can only say that there must be some overlap, and that therefore some 'a' is 'b'.

In a similar way, the falseness of 'Some "a" is "b" ' demonstrates the truth of 'No "a" is "b" ', and the falseness of 'Some "a" is not "b" ' the truth of 'All "a" is "b" '.

It was my own practical difficulties as a student in making the best use of Venn's diagrams, indeed a vagueness about the whole point of them lasting for several weeks, which impressed me with the necessity of re-designing them. Venn's sole object in devising these symbols was a better understanding of the rules of logic, and I now suggest that his original diagrams are not quite adequate for this purpose and that the diagrams in the new form just outlined provide a truer and less confusing representation of the relative positions of 'a' and 'b' in the various formal propositions.

CORRESPONDENCE

THE NIGERIAN STUDENT

SIR,

Mr. Martin Banham's article in your issue of August 1958 on the problems of the Nigerian student is typical of the way most of the problems of the Nigerian undergraduate in Ibadan are solved. He has all the blame on any matter and no one has the time and sometimes the ability to look at the other side of the story.

Mr. Banham attributes the poor results and the mental breakdown of the Nigerian undergraduate to the fact that he goes to the University at an older age than his British counterpart and that he feels himself of far more local importance and the consequence is far too hard work and strain. The logic of his argument is that if these two factors are eliminated, the results would improve. One wonders how far these factors, even if they were true, can lead to the crisis in university life that is already too obvious in Ibadan.

This is a disastrous over-simplification of the nature of the problem facing the Nigerian undergraduate today. The article fails to take note of the quality of the education the average Nigerian student obtains before going on to the university either here or in Britain, and the relevance of a major part of his curricula throughout his education to his environment and experience. Apart from this, he is faced here in Ibadan with a host of professors and lecturers most of whom are second and third rate by any standard who in addition to not knowing their subjects, are not prepared to understand the environment or consider the question that an African university has an identity and quality of its own that must be analysed and grasped if success is to be attained.

Take the college library in Ibadan for instance. One would expect that because of the difficulty of recruiting first-class men, the library would be properly equipped and brought up to date so that the undirected student can obtain assistance in his work. But the library is a stagnant affair and if the old books of the late Henry Carr were not there, the whole building would be another white elephant while so much money is being spent unwisely in useless and unnecessary

projects. What Mr. Banham does not understand is that so many frustrated Ibadan undergraduates spend more time brooding over the dead end to which they have been brought in their university career than in his 'harder work, desperate hours, undermined efficiency, worse results'. It is gratifying that side by side with Mr. Banham's article in the same issue, is the well thought out and sympathetic article of Mr. Thomas Hodgkin on the 'Idea of an African University'. Mr. Hodgkin has put his finger on the fundamental and basic facts, and it is urgent that the problems of the new African universities be pursued along the lines he has hinted.

Yours faithfully,

OBIAJUNWA WALI

University College,
Ibadan, Nigeria.

[The writer, Obiajunwa Wali, is a final year Honours student in English. *Ed.*]

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REVIEWS

The U.G.C. Quinquennial Report 1952-57.

The recently published U.G.C. Report is a statesmanlike document which though necessarily much concerned with problems of finance and administration does not ignore the essentially educational questions which underly these problems. The Committee's concern with assisting the Universities to become 'fully adequate to the national needs' (and this is the phrase used in its terms of reference) has however confused the truly educational issues. The Committee is not unaware that the 'national need' is for the true education of its citizens; but for the major part of the report the phrase seems to be narrowly equated with the supply of trained manpower. As a result of this there is rather cursory treatment of some topics that should have been more fully discussed, and it seems to me that as a result there are serious misconceptions permeating the report. One has however to make the reservation that different parts of the report seem to show differences of view on essential questions.

One of the essentials that the report rightly stresses is the importance of the universities' encouraging students to think and to acquire an independent mind and good judgment. It is, however, to be regretted that it does not throw much light upon the question of how such independent thinking is to be encouraged. It recognizes the danger of 'memorizing knowledge' and is aware of the encouragement most examinations give to such memorization. The only prescription for ensuring that students become thinkers is that they must be given 'not only competence in one field of knowledge, but access to related fields of knowledge'. It does not however draw attention to the correlative fact that the development of students' powers of thinking is the main criterion of good teaching, nor does it ask for more reflection upon the way teachers may be helped to become better teachers in this essential sense.

The report does indeed stress the importance of appointing good teachers, but in doing so it tacitly defines a good teacher by the way he presents his subject; not by the nature of the learning he elicits

from his pupil. The discussion of good teaching is moreover marred by a misleading antithesis between 'content' and 'presentation'. This suggests the kind of teaching which is referred to in another place as 'supplying information'. Springing from this bad antithesis comes the attempt to correct the notion that the teacher's task is to ensure the absorption of 'content' by insisting that he must also convey to the student his love for the subject. True enough he must; but love of the subject added to knowledge of content is not scholarship. It may indeed result in no more than a passion for catalogues. The sum of the two does not amount to the discriminating perception, disciplined judgment, and active imagination, that we know to be the mark of a good specialist. If there were some nutshell of a phrase in which the report could have packed this truth—especially in relation to learning rather than to teaching—we should not have been made so uneasy over what the report has to say on the matter of 'depth' and 'width' of learning. We might even have gained some insight into what it is that exonerates either the trained specialist or the broadly educated man from the charge of 'superficiality'.

Another, and not unrelated, ground for uneasiness is the way in which the report seems to be satisfied with fostering in students what one might call a 'spectator mentality'. It is assumed that teaching which combines 'width and depth' will ensure that the student 'learns about the dangers of superficiality'. To protest against this phrase is not just carping. It is a common and serious fault for students to be very glib *about* the dangers of superficiality while markedly failing to show the character of mind which contrasts with it. Again (on p. 39) in the course of deprecating narrowness of interest the report urges that the student should be given 'a general appreciation of the art of learning'. This (leaving aside the question of whether there is *an* art of learning) is the intellectualist fallacy at its most obvious. It is not 'appreciation' that will bring the student understanding of what learning is (whether in one field or in many fields) but experience of learning; and it is surely not appreciation he ought to exhibit but competence. It is indeed impossible to appreciate any form of learning—if this means more than repeating pious generalizations about it—except by learning to do something, however rudimentary, of the same sort.

The U.G.C., of course, is not unaware of this: but many of the readers of its report surely are. And it is not irrelevant to this point that in para 73 we are told how the student needs 'to be given the

sense of being in touch with creative work in which, if he does well, he may later be privileged to take a part'. Of course there is small hope for the soul of the undergraduate who does not realize how elementary all undergraduate study is, and is not constantly aware that he is barely past learning his ABC. But it is also true that if his work is to be of any value at all it must be creative even when he is marching the same course as other students by the hundred thousand.

It is claimed that, when it comes to the time of graduation, the student who has learned to think with independence of mind, critical judgment and so forth will be well equipped even if he enters an occupation to which his speciality has no direct relevance. But he will not be so equipped, not by a long way, unless his education has given him the sort of humanity that enables him to deal with his fellow men. The report recognizes this too, but, though paying tribute to the educative value of the 'humanities', it forgets to point out that the cultivation of sympathy and humane feeling, as an accompaniment to the development of humane thought, is part of the 'equipment' without which the best of minds won't get far in most occupations. The university has too often, in its efforts to sharpen intellectual power, stultified the power to feel. In addition, its efforts to sharpen critical faculties have often served to deaden enthusiasm for learning. The report draws welcome attention to this latter danger in relation to the study of literature but one would be happier if its other reflections on the aim of University education had indicated more clearly the nature of the risk.

An immensely important topic with which the report deals but briefly is that of university selection and its effects on the teaching done in the schools. The evils which develop as a result of failure to deal effectively with the task of selection are well known, and clearly there is no simple solution. But one would like to see urgent thought given, perhaps with the support of experimental investigation, to ways of mitigating the dilemma of heads of university departments who have no workable criterion of selection, as things are at present, unless they lay the sort of weight on G.C.E. marks that has a very onerous and distorting effect on the work of the schools. If the universities are concerned, as they should be, with education as a whole, they owe it to the schools and to society at large to seek urgently some solution of these difficulties.

JOHN PILLEY.

Communism and Social Democracy 1914-1931. G. D. H. COLE. *Macmillan, 70s.*

These two volumes are described as volume IV of Professor Cole's *History of socialist thought*. Three different books, in fact, are included within them: a history of such developments as took place in socialist thought in these years; an account of the affairs of all parties which had any claim to be called socialist; and an analysis of the early struggles between reformist socialists and revolutionary communists for the sympathies and allegiance of working classes the world over.

The first two books-within-the-book can perhaps be disposed of briefly. There were few advances in socialist theory in these years; for most of the distinguished socialist thinkers were engaged in practical rather than speculative politics. The problem, by 1914, was no longer to discover what was to be done, but to do it; and Cole feels no temptation to regard 'as advances in Socialist thinking' the practical development of 'the Leninist conceptions of proletarian dictatorship and one-party-rule', whether carried out in Lenin's lifetime or, on lines Lenin had laid down, continued by Stalin after Lenin's death. In Stalin's 'bureaucratisation of the Communist Party machine' Cole

> can see nothing that can properly be called a development of socialist thought, unless one is prepared to regard in that light the acceptance and working out of the idea that it was possible to establish Socialism in a single country, Russia, without waiting for the Revolution to be achieved in the advanced capitalist countries, and without looking to the workers of these countries for any substantial positive help . . . the Bolsheviks of 1917 were united in taking almost for granted the impracticability of maintaining themselves in power unless the World Revolution, or at the very least the German Revolution, came to their aid.

And he finds the project of building socialism in one country 'a product of necessity, rather than of invention'.

The histories of the world's socialist parties are admirable thumbnail sketches; if one happens to want to know the history of the socialist movement in Bulgaria, say, or New Zealand, or Peru, in the nineteen-twenties, its summary is here; and the author has again been at some trouble to place the hundreds of socialist leaders whose names he quotes in historical perspective to each other by giving their birth and death dates, when these are ascertainable. (There are some odd question marks here—Togliatti's birth, for instance; and for many of

the Russians the date, or even the fact, of death is uncertain.) But many of these sketches are the merest outlines; no source is quoted for any particular statement of fact; and singularly little actual socialist achievement is recorded. Had Professor Cole been writing one of his economic histories, he would have given no doubt the figures of capitalists expropriated and industries socialized that he here altogether omits.

The main interest of the book lies of course in its dealings with the Russian revolution and with the struggles between the second and the third internationals. Cole regards the revolution as one of the greatest and most splendid things that have happened in history; but he has little use for its exploitation by the leaders of the C.P.S.U. He strongly admires Lenin—'never, I think, a lover of power for its own sake, or corrupted by it'; though he doubts whether Lenin was right in assuming *salus Revolutionis* to be *suprema lex*: 'Surely the Revolution, however important it may be, is not an end in itself, but only a means to something else—I should say, to the greater well-being and happiness of the individuals whose lives it affects.' (This brings out clearly the Benthamite in Cole.) Trotsky he finds 'most genuinely devoted to the revolutionary cause and devoid of merely *personal* ambition', and moreover 'by both instinct and conviction, more a Soviet than a Party man'. Cole's account of the soviets of 1917, as a political institution, carries conviction:

> a magnificent revolutionary instrument . . . entirely flexible . . . , changing from day to day in response to every change in attitude or opinion among the working masses and commanding confidence because no member of it had any security of tenure if he failed to reflect his constituents' feelings and desires.

He is compelled to add that Stalin twisted the soviets under the control of the party, and forged from them an instrument of terror and repression. Of the struggle between the internationals he concludes sadly that it was 'a battle between two wrongs which were quite unable to join forces to make a right'.

The death of Cole gives this book considerable appeal for the autobiographical fragments it contains. As his successor at Oxford, Sir Isaiah Berlin, remarked in his inaugural lecture, Cole was a man of such clarity of vision and such intellectual integrity that he secured respect from anyone who had worked with him; and Cole's reflexions on the labour movement to which he had devoted his life are bound to command attention. He was well placed for observing

what went on in this field of study, for he was already a prominent Guild Socialist by 1914, and had the good fortune to live in a country where as a sincere pacifist he was not forced onto the battle fronts of the great war. Poised to the left of the reformists, and to the right of the bolsheviks, Cole could understand and sympathize with the problems and difficulties of both; he was too good a humanist to accept 'ineluctable historical necessity' and its consequential police terror, and too good a radical to accept the half-truths and compromises which have led so many social democrats to so many failures. This is a sad book, describing a series of disasters; yet it is sustained by a good socialist's faith in the victory of socialism, if reasonable men will work for it in a reasonable way.

M. R. D. Foot

New University. JACK SIMONS. *Leicester University Press*, 12*s.* 6*d.*

Leicester set a new precedent in university founding. The preceding fifteen university institutions all carved out their own diocesan areas: Leicester was the first that had to do so with an existing university less than 25 miles away. It was the first to be conceived in a purely educational as opposed to a clerical or technical matrix, for amongst its most active promoters were F. P. Armitage and Major Brockington, the Directors of Education for the City and County of Leicestershire respectively. It was also the first to be generated in a mood of post-war reconstruction. And (in this it has hitherto been unique) it was the first modern English university to operate in a Georgian building. This it begun to do on October 4th, 1921 with 9 students. The Georgian building (originally the Leicestershire Lunatic Asylum bought for £40,000 by Thomas Fielding Johnson) did not enable Leicester to avoid coming up the hard way. In this it was like its predecessors. London began on a disused rubbish dump in Gower Street, Leeds in a disused bankruptcy court and Liverpool in a disused lunatic asylum. But whereas they grew, through federal relationships, to a larger autonomy, Leicester grew without them.

It began with roots that clutched the very loam of its region, going back to the local Literary and Philosophical Society which had been founded in 1835. One member of this Society, Charles Packe, had proposed a college analogous to Manchester's Owens College in 1880. Another, the Rev. James Went of the Wiggeston Boys' School, had expressed similar hopes in 1889. So did S. D. Paul in 1895. Dr. Astley

V. Clarke's green fingers brought the project to flower. After many delays, the mayor of the town summoned a meeting on March 8th, 1918. Excited by the interest shown in it by the *Leicester Daily Post*, the promoters flirted with the idea of a federal University of Mercia as a war memorial. Thanks to Dr. Astley Clarke that was not so. A proposed federal relationship with Nottingham was soon discredited, in spite of Major Brockington's advocacy, and the college began life with the appointment of the editor of the *Leicester Daily Post*, Mr. W. G. Gibbs, as secretary, and that of Dr. R. F. Rattray as principal.

Leicester never really shook off the federal idea. Negotiations were re-opened with Nottingham in 1927-8 and again in 1938. Even in 1944 Sir Walter Moberly, as chairman of the University Grants Committee, was prepared to consider 'a scheme for a federal university. Proposals for associating the Domestic Science College were discussed and dropped in 1927-8. Co-ordination with the Leicester Colleges of Art and Technology was mooted in 1930. A lasting relationship with an older adult education body, Vaughan College, was made and still lasts. But when it was proposed that the College of Technology should become the Faculty of Technology within the University, an eighteen month debate was virtually decided by the University Grants Committee refusing the necessary money. Starved of a fruitful connection with a flourishing faculty of technology, Leicester was also refused a medical school by the Goodenough Committee, this in spite of the warm advocacy of Dr. Astley Clarke.

For thirty-five years until 1957, Leicester grew under the London umbrella, the last of regional universities so to do. 'Regional' is an adjective which Leicester has done much to justify, for it has never neglected to cultivate its region. Indeed its record is particularly distinguished in this respect, as the studies of Dr. W. G. Hoskins, Mr. H. P. R. Finberg and Professor Simmons himself show. 'Quiet, undemonstrative, under-emphatic', are Professor Simmons' adjectives for the university, and this reviewer, for one, disagrees. None of these adjectives (to the outsider) are applicable to the major schools of the university and its Press has quite a reputation. In his timely and topical history, Professor Simmons remarks, with a touch of nostalgia, that Leicester is probably the last university to be founded and developed by private benefaction. Standardization and the worship of economy, he points out, will tend to increase in spite of the excellent relationships which universities enjoy with the U.G.C. So his overt plea for private benefactors as agents of alleviation is very

relevant. Current speculation as to the resources from which the 14 new universities proposed by Professor Balchin centre round State aid. Should it be so in all cases? New universities need books, and Professor Simmons' story of Thomas Hatton, a boot maker and boxing promoter who endowed Leicester with a fine collection of topographical and local historical works, might stimulate contemporary plutocrats of the pools and television to do likewise.

Industry, too, can help much more than it now does. For instance, the collective generosity of the F.B.I. towards our public schools might well be followed by a similar collective gesture to our newer universities, both on the stocks and to come. Carlisle, Lancaster, York, Lincoln, Shrewsbury, Norwich, Ipswich, Hereford, Gloucester, Canterbury, Weymouth, Plymouth and Truro will, no less than the emergent University College of Sussex, have claims on the private generosity of the coming generation like Leicester had on the generation now leaving us. Even if a quite different line of policy is followed, and the new universities are to be built around colleges of advanced technology. As they win their spurs, the case for endowments is equally strong. Generosity to the local C.A.T. is not unknown today, as any visitor to them can testify. And generosity can do so much if organized, as witness the new foundations at Oxford and Cambridge. If Churchill College had been sited at time-honoured Lancaster, York or Canterbury what a great lead would have been given. One thinks too, on reading Professor Simmons' book, of the increasing paucity of suitable 'shells' for these new universities to inhabit: no more disused asylums, no more old bankruptcy courts. Instead it is more likely that they will be planned *de novo*—tertiary adjuncts of secondary schools, only one hopes less glossy and less standardized. Leicester may well be the last of the universities as we have known them. So, the arguments he advances for continuing the endowment system are strong, even though it is inevitable that the state will have to provide well over ninety per cent of the running expenses and capital grants. For the disposability of an endowment on any object which the Senate (or Faculty) regards as necessary, no less than its tendency to attract further endowments, cannot be denied. Nor can the feeling of independence enjoyed by the endowed university, be its endowment ever so small, be gainsaid. Universities must continue to be vested, non-vested interests in the modern world.

The ever increasing necessity of State aid, together with Lord Simon's loud detonation in the last number of the *Universities*

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Quarterly, will no doubt loose the hounds of a Royal Commission on the universities. Will they bay at collectivist intruders or separate into packs to hunt down the foxy individualists? To judge by previous Royal Commissions, they will do both. Yet if the expectant teeth of a commission seek well-fleshed academic flanks in the coverts they will be disappointed. The foxes of Leicestershire are lean and sinewy, inured to long runs on short rations. And not the least impressive part of Professor Simmons' entertaining and authoritative history is the extent of their courses to date. But then, this is Quorn country.

W. H. G. ARMYTAGE

Personal Knowledge. MICHAEL POLANYI. *Routledge*, 42*s*.

The reflections of a man of outstanding scientific ability on his own methods of working are always fascinating and fruitful. But they are not always trustworthy, and they are not always philosophy. Like the music of the chemist Borodin or the naval officer Rimsky-Korsakov, they tend to lack the concentration of purpose and the logical precision which are the mark of the great masters of philosophy: on the other hand, the gifted amateur is always more prodigal with his ideas, and makes up for the lack of true inner cohesion with attractive and memorable raw material—again like Borodin.

Professor Polanyi's Gifford lectures are by these standards the work of a highly gifted amateur. They are advertised as an essay 'towards a post-critical philosophy', as though Professor Polanyi were taking the next major step on from Kant. The book, he says, is 'an enquiry into the nature and justification of scientific knowledge', intended to effect a complete conceptual reform in our thought about scientific discovery. Yet it is doubtful whether the result can be classified—in any but a loose sense of the term—as Philosophy. The great questions that logicians and metaphysicians from Plato through Kant to the present day have struggled with are not really attacked. Professor Polanyi may believe that his illuminating and intriguing, though discursive account of scientific discovery deals with these questions by implication, but the fact is that the philosophical relevance of his suggestions needs to be demonstrated. To give just one instance, he treats the problem of induction as concerned with methods of scientific discovery, and throws a good deal of light on

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this process by drawing analogies with technological and other kinds of discovery; yet this is to mistake the philosophical issue, which has always been concerned less with the methods of science than with the *ex post facto justification* of the results.

It is not as unfair as it may seem to start a review with this criticism, since to get the full riches from Professor Polanyi's book it is essential to disregard the irrelevant claims it makes. (It is as though Borodin had advertised himself as a master of counterpoint.) In fact there is a lot to be got out of the work as one goes along. Like many other recent writers on science, Professor Polanyi rejects the sort of positivism which denies the scientist any title to being an imaginative thinker. Following Duhem, Popper and Einstein, he insists that the progress of science is as creative an exercise in the invention of ideas and intellectual techniques as any other fine art is in its own medium. And he seeks to characterize the nature of intellectual enquiry and discovery, first generically by comparing it with the tentative activities of apes and the practical activities of craftsmen, then more specifically in terms of a Gestalt theory of concept-formation and -use. At every stage he illustrates his argument with examples and anecdotes from the history of science, from contemporary psychological experiments (especially rat-running), from statistics, ethology, sociology and biology: dipping into the book at any point will always set one thinking along new lines. Professor Polanyi is in fact one of those who continually have in mind the autonomous element in our intellectual activities. This is an element which the 19th century idealist philosophers took as the starting point of their theories, but which empiricists have never done full justice to, and it is one which in contemporary philosophy has been returning in full force as a result of reflection on the nature of language.

It is rather disappointing that Professor Polanyi does not recognize his own allies. Perhaps he likes to see himself as originating a movement of intellectual revolt and reform. Yet he speaks in the language of a very definite tradition. Some idealist philosophers may have been incompetent or misguided, but there were points they saw and insisted on which we ought not to ignore; and the later work of Wittgenstein was (among other things) concerned to relate these points to the structure of our symbolic apparatus of thought. Wittgenstein as much as Polanyi insisted on the relevance of Gestalt psychology to any analysis of the intellect, and it is surprising to find him so quickly dismissed: Duhem and Popper also, to say nothing of

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Hegel, are only referred to in passing. (Einstein on the other hand is treated with much more respect—perhaps because he was so eminent a scientist.)

As a contribution to the psychology of the intellect, the book is of great interest. Psychological theory is still so far from having found a definitive method that so discursive a book can still be useful. Yet the pursuit of philosophical system does lead Professor Polanyi into exaggeration, and this may distract people from the intrinsic interest of his material. In particular it saddles him with an extraordinary and idiosyncratic terminology which I for one cannot believe will take general hold: instead it may put off even sympathetic readers. And at times the models in which his psychological insights are cast become almost grotesque. Consider the following electro-alchemical metaphor, which recalls the neuro-electric terminology Freud at first used to express his psycho-pathological insights but later (thank heavens) discarded:

> Let me now introduce the concept of a *heuristic field*. We assume that the gradient of a discovery, measured by the nearness of discovery prompts the mind towards it. The assumption of a heuristic field explains now how it is possible that we acquire knowledge and believe that we can hold it, though we can do this only on evidence which cannot justify these acts by any acceptable strict rules. It suggests that we may do so because an innate affinity for making contact with reality moves our thoughts to increase ever further our hold on reality.

This fancy is meant seriously and proliferates. Heuristic fields have 'lines of force', and also 'the power to consolidate centres of first causes'. They carry 'ordering forces', even 'orderly innovating principles', which are a pointer to God. Polanyi multiplies explanatory fictions of this kind, while all along the proper task is not explanatory, but analytical and descriptive. As he puts it himself, the teleological character of 'the machine-like equipment' of living beings is *logically* inherent in 'the conception of jointly functioning organs'. Vitality is a defining character of living things, not a hypothetical ingredient making them tick. A clear enough account of animal and human activities—practical and intellectual—would dispense with these fictions. Their presence in Polanyi's system is one more sign that the success of his enterprise has been only partial.

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Year Book of Education 1958: The Secondary School Curriculum. Eds. JOSEPH LAUWERYS and GEORGE BEREDAY. *Evans Bros.*, 63*s*.

It is no disrespect to the distinguished contributors to the 1958 *Year Book of Education*, which is about the secondary school curriculum, to say that we wish that some of them had been differently chosen. When the curriculum of schools is under scrutiny, something from a head master in office would not have come amiss. As it is, the *Year Book* never gets to grips with the curriculum in terms of subjects, courses, timetables and syllabuses. Instead, it is surveyed from afar, from the viewpoints of sociology, psychology, epistemology, politics, pedagogy, administration, comparative education, mental health and history. This is interesting, if not new; but it leaves us unsatisfied at a time when the place of science in education and the balance between general education and specialization are questions that demand to be answered in practical ways. It is, no doubt, fascinating to the professional educationist to analyse the various forces at work on shaping the curriculum (though sometimes we wish he would strive less after scientific effects), but the result of such inquiries can only be descriptive. No advance in the curriculum, no new subject (of which in places the *Year Book* speaks longingly) will come from observations of this kind.

Nobody is likely to dispute the contention of the *Year Book* that the curriculum of English grammar schools is intimately bound up with the universities. It would, therefore, have been interesting to hear what is expected from the schools by those university teachers now engaged in shaping new curricula in the universities. What do the universities look for from the schools? What can the schools reasonably be expected to give? These questions are well worth examining again, but no light is shed on them by the *Year Book*. It is not difficult to think of several men who, having had experience as heads of schools and heads of houses or vice-chancellors, would have been in a position to make an invaluable comment on this aspect of school and university relationships.

The way in which our universities exercise their control over grammar school education, and indeed over all secondary education, is twofold. When it is a matter of open scholarships, university entrance and the G.C.E. examinations, the influence of the universities is obvious and direct. It raises the question how far university entrance requirements should govern the schooling of the majority

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of pupils in grammar schools who will not enter a university; and what effect, through examinations, the universities ought to have on technical and modern school work. But the universities make themselves felt, even more powerfully, in a less direct way. Practically the whole of our teaching force is educated either in universities or in training colleges connected with universities. When teachers in schools make judgements about the curriculum, they do so, in varying degrees of awareness, with reference to notions acquired at or derived from universities about what education is. When we reflect that in England the Ministry of Education has only a remote control over what is taught in schools, the responsibility placed on universities is seen to be heavy.

This responsibility does not go unchallenged. Some argue that the schools should emancipate themselves from too close a control by the universities. The fact that the term academic has acquired, in certain educational usages, a pejorative connotation testifies to this. Certain contributors to the *Year Book* itself give the impression that what is taught in schools were best decided by psychologists, sociologists and educationists. This prompts an important question, partly and frighteningly answered by the *Year Book* itself. What are the alternatives to university control of the school curriculum? The alternatives are clear, and have been tried, with what seem to us alarming results, in certain other countries of which there are accounts in the *Year Book*. The void left by the universities can be filled by politicians and administrators (in which case the universities must accept what the schools send them), by parents, by teachers (a closed shop), or by educationists (is this what the *Year Book* would really like?). The results generally of any or all of these alternatives appear to be a more or less virulent anti-intellectual curriculum, with a premium on civics, social studies and driver education. There is a salutary comment on this sort of curriculum implicit in the chapter called, significantly, the Primacy of the Rational in French Secondary Education.

English universities do not exert their influence on the school curriculum, of which they are the ultimate custodians, in disregard of the legitimate needs, wishes and functions of the schools themselves. The close association which always existed between the distinguished schools and Oxbridge serves, or should serve, as an example. Teachers nowadays have full opportunity to express their opinions on the demands made by the universities. Not many, however, submit alternative courses for examination by the G.C.E. boards and it is

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ironic that the teachers in schools obstruct the efforts of the science dons to prune the G.C.E. syllabuses.

Teachers generally in English schools have confidence in the universities. This seems right. There is already sufficient time-lag between what is learnt in universities and what is taught in schools to make it an act of folly for the schools to cut themselves off from the *fons et origo* of their work. It is true that in secondary modern schools the influence of the university needs careful interpretation, but it should still be felt. As long as education is concerned with the mind, schools should rejoice in their connection with the university. Contrary to what the *Year Book* seems to suggest, universities nowadays are not static and conservative institutions; new subjects, even new ideas, sometimes find their way more easily into universities than into schools if only because they originate in universities. If, however, the universities should ever abandon their concern for education in pursuit of other objectives, then it would be useless for them to ask the schools to succeed where they had failed. In his contribution to the *Year Book*, I. L. Kandel writes, 'it is effective or liberal teaching—a process between the teacher and taught—and not the subject, that can impart a liberal education'. This is true also of the university. The mechanics of the relationship between the school curriculum and the university need constant attention, but of the essential rightness of its existence there can surely be no doubt.

L. F. NEAL

Islam and the Arabs. ROM LANDAU. *Allen and Unwin*, 30*s*.

The author of this book, already well known for his studies of Morocco, is at present Professor of Islamic and North African Studies at the College of the Pacific in San Francisco. He has written this volume as a guide to Islamic civilization for the student of history or philosophy who knows little or no Arabic; appended to each chapter is a chronological summary and a book list; and the book as a whole is pleasantly written.

Professor Landau confesses in his Preface that the demand for the volume came from his graduate students, and that some of the material is based on lectures in class. It is this source of origin that, no doubt, gives the polish and form that is the characteristic of each chapter. The major points are made succinctly and gracefully. But the same happy character is missing from the book as a whole, which

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is neither history nor philosophy nor 'culture'. The first four chapters give a very cursory survey from Arabia before Mohammed down to the end of the Ottoman Empire; they are followed by three chapters that are chronologically out of place (The Crusades, The Maghreb, and Muslim Spain) of which only that on the Maghreb is in any sense a full treatment; and then follow the most valuable chapters in the book, on the Sharia, Philosophy, The Sciences, Literature and The Arts. While it is refreshing to have this emphasis on the cultural contribution of the Arab peoples, these twelve chapters are for the most part brief essays that merely touch the fringe of the subject. The author could well have spread himself on his chosen fields, the Maghreb and its civilization, instead of attempting so vast a canvas.

The final chapter, Problems of the present Arab world, is the most lengthy and, at the beginning at least, the most controversial. It consists of a two-page commentary on each Arab country prefaced by an account of the great 'Betrayal' of the Arabs by Britain in 1914-18. At this point Professor Landau is not writing history but Arab propaganda; the view expressed is that of Antonius and the Arab nationalists. No doubt the Arabs had, and have, a sense of grievance but what matters is not whether we judge the past from their point of view rather than our own (p. 239), but what really happened at the time: were their grievances justified? Professor Landau here minimizes Hussein's ambition and untrustworthiness. It was not Kitchener who approached Hussein (p. 241) but vice versa, and pre 1914 as well as post. Who were their 'fellows' whom the three Hashemites induced to join them? Was the clash with Jewry inevitable? And just what—*pace* the Lawrence legend—did the Arab levies do that really shortened the War? This is old and mythical stuff: though many a nation cherishes such mythology about its origins.

All this said, Professor Landau is, of course, perfectly correct in his statement that the Arabs felt aggrieved (albeit it was far truer of their leaders than of the Arab peoples). He hardly allows himself room to tell any full story of events since 1918, but his book is, as a whole, both persuasive and readable. It is a short but useful guide to the main features of the Arab way of life by one who knows it well and writes with sympathy and warmth.

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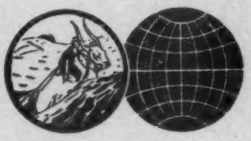

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